A Database Publication

THE MICRO USER

Volume 6
Number 6
August 1988
£1.50

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1. Winchester Unit – (winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.
2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS ROM and utilities available at an extra cost).
3. Winchester user guide.
4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disk drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

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Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).

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Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

Subscription rates for 12 issues, post free:

£18 – UK
£28 – Europe (incl. Eire)
£34 – Overseas Surface
£45 – Overseas Air

ABC 59,727 Jan-June 1986
ISSN 0265-4040

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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Cover story

At last there is a word processing/ spreadsheet that is file compatible across a whole range of micros – Z88, BBC Micro series, Archimedes and even PC and compatibles.

In its BBC Micro form it is called View Professional and on Page 30 we take an in-depth look at this versatile package.

FontStyle

The presentation of your work can be greatly enhanced by the use of a good font. On Page 37 we tell you how to design them and on Page 45 there's a super offer for a designer so you can easily create documents like the one shown right.

We're Moving!

Dear John,

As you know we've been planning to move house and the time has come at last! So from 15th August 1988 we will be at:

The Vicarage
Cloppice Green
Hathersage
West Yorks
HG23 5BT

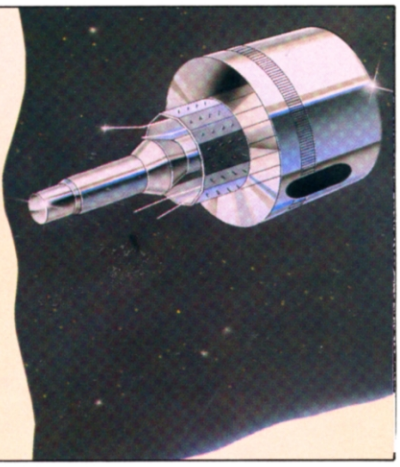
I hope to see you soon. We'll be having a party as soon as we're settled in.

All the best

Graham Bartholomew

PICTURES FROM SPACE

WeatherLink, the MicroLink-based satellite picture service, has been upgraded to provide high-resolution weather maps for BBC Micro and Archimedes users. On Page 66 we provide full details of what's available and an example photograph – which you can recreate on your own with the program supplied on this month's *Micro User* disc.



MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 124** find just what you're looking for – from cheap modems to complete computer systems.

For full details on how the checksums work, see the Get-it-Right article on Page 28 of the February 1988 issue of *The Micro User*.

The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.

NEXT MONTH

COMMUNICATIONS
How Email began
UTILITY
Half-size characters
CHALLENGE
The puzzle solved
REVIEW
Computerlock

THE MICRO USER

September 1988 issue on sale August 3

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BEEBUG

The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information for beginners and experts alike. All our programs are tested on all versions of the BBC Micro, and are also available monthly on disc or tape.

RISC USER

This is the magazine for everyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes; it does not contain modified programs originally intended for the Model B or Master.

BEEBUG and RISC User are both published 10 times a year and are only available on subscription, not through the shops.

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MU8

NEWS beat

Acorn ups Arc prices

ACORN has increased its recommended retail prices for almost all the Archimedes range, along with a number of the machines' peripherals.

Only the Archimedes 305 emerged unscathed in what general sales manager Terry Shurwood described as a demonstration that "Acorn is not immune to the fluctuations affecting the computer industry".

Shurwood told *The Micro User*: "In the interests of market stability, it is our policy to minimise the frequency at which we make changes to our recommended prices".

He pointed out that "the previous alteration to Acorn prices was in the last quarter of 1987 and in the months since then there have been a number of changes in the commercial climate that Acorn has to operate in".

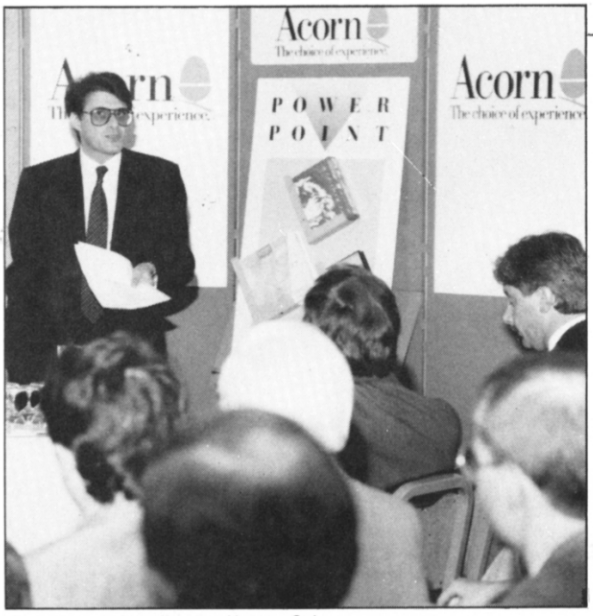
The Archimedes 310 will now sell for £835, with mono monitor £895 and with colour display £1,055.

The new price for the Archimedes 440 is £2,529, with mono monitor £2,589 and with colour display £2,749.

The 0.5Mb ram upgrade for the 300 series now costs £149, an additional floppy disc £125 and 20Mb high speed hard disc and controller card £499.

For both the 300 and 400 series, the I/O expansion card is £85 and the music Midi add-on £39. The recently released separate Midi expansion card is £69.

Prices of the Master 128 and Master Compact remain unchanged.



Acorn managing director Harvey Coleman addresses dealers and distributors

Coleman states his case

FOLLOWING recent criticism about poor communication with third party suppliers and the people who sell its products, Acorn has been extending a fraternal hand in a nationwide series of conferences.

Addressing more than 50 dealers and distributors in the company's home town of Cambridge, Acorn managing director Harvey Coleman outlined his marketing strategy.

Sales and marketing director Ian Laurence spoke about new target markets for the Archimedes.

MICROS AND MEDICINE GO ON SHOW

HOW Acorn technology is helping medical science was illustrated in depth during the UK's largest health care exhibition at Brighton.

Treatment for Aids, optical research, advanced interactive video training systems and patient rehabilitation were some of the medical applications of Acorn computers demonstrated at Healthcare Computing 88.

Acorn dealer and image processing specialist Wild Vision created much interest with its Hawk V8 video system running on a Master 128.

Video images are digitised and written in real time directly into the Master's video display memory for instant frame grabbing or moving picture analysis. The data capture and transfer is transparent to the microprocessor, leaving it free to run image processing software.

One of the applications of the Hawk V8 seen at the exhibition is the animal activity monitor, developed by Wild Vision with the help of Dr Paul Flecknell of the Comparative Biology Centre at Newcastle University.

An animal is observed by a video camera, then the signals are digitised and fed to a Master 128 which calculates the centroid of the animal in order to analyse and record its movements.

Also based on the Hawk V8 system is the Pedobaroscope PBS100 for scanning pressure distribution under feet, and an image analysis system for use in applications like medical scanning, quantitative microscopy and particle size analysis.

Also at the exhibition, an advanced interactive video system illustrated other programs used in knee and Aids treatments. Wild Vision is currently developing image

Turn to Page 9 ►

SKY WATCH SCRAPPED

ONE of the most popular features of Prestel has now been withdrawn.

Sky Watch, which enabled people to see on their screens the departures and arrivals boards at all UK airports, has been discontinued indefinitely. This follows the decision by the British Airports Authority to withdraw their support for the service.

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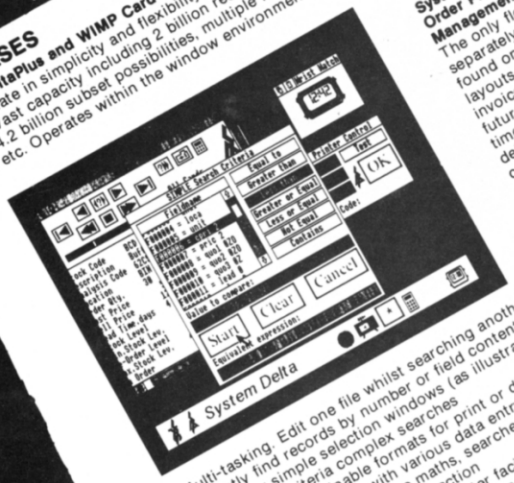

- Multi-tasking. Edit one file whilst searching another
- Instantly find records by number or field content
- Search by simple selection windows (as illustration)
- Or multiple criteria complex searches
- Multiple user-definable formats for print or display
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NEWS beat

Teletext for BBC Micro

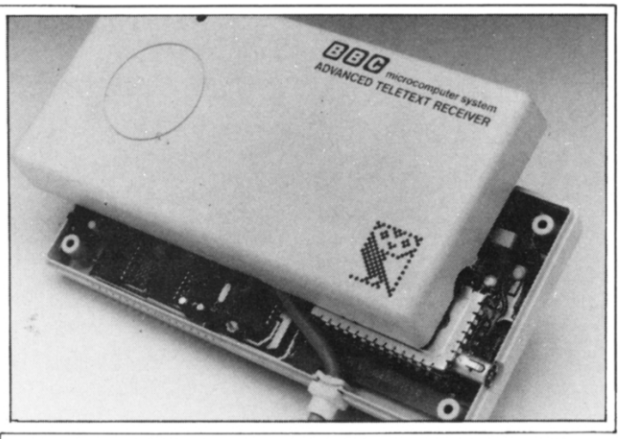
A NEW advanced teletext receiver has been developed for use with the BBC Micro and Master by General Information Systems (0480 87464).

"The design incorporates many of the advances made possible by recent developments in teletext chip technology", commented a GIS spokesman.

It takes its power from the micro's auxiliary output. Tuning is carried out by an auto-scan system and the adapter is capable of keeping up to eight channel frequencies in non-volatile storage.

The director of GIS, Mr Ram Banerjee, said: "The potential for the imaginative enthusiast is almost endless since the program mode allows development of a countless number of applications.

"Once transmissions start the unit will be capable of producing higher definition – level three – teletext and some parts of level five". Price £149.



DEMAND SLOWS 400 DELIVERIES

ANYONE intending to buy an Archimedes 410 could have a long wait ahead of them. Acorn says it will probably be the end of the year before supplies of the expandable version of the 400 series are available.

The reason is that demand for the 440 has been much greater than anticipated.

Both enhanced machines share the same production line so something had to give – and as the 440 earns Acorn approximately £1,000 more than the 410, the less powerful machine had to give way.

"Demand for the 440 has been very high indeed, and frankly we underestimated the strength of its popularity", said an Acorn spokeswoman.

"Demand is slightly less for the 410, and as both machines use the same production line we are concentrating on the 440 for obvious reasons".

The 440, costing £2,529 to £2,749, is a much more complete system than the 410 which is about £1,000 cheaper.

Although the 410 is expandable to 440 capability, it has not caught the imagination like its bigger brother.

As one buyer put it: "If you don't intend to expand you might as well get an Archimedes 310 for under £1,000. If you know you will expand you might as well buy the 440 in the first place and save yourself the bother of fiddling about with add-ons".

Another main reason why demand for the 410 has lagged behind is that the 440's big memory and hard disc are much more in tune with what the market wants.

And that market is increasingly the lucrative sectors of education, software development and large organisations.

◀ From Page 7

analysis systems to exploit the power of the Archimedes' Risc-based environment.

Vital information for the treatment of glaucoma can be obtained by the use of Digit, a program designed by Dr Brian Hayes from the Institute of Ophthalmology in London.

To enable image analysis of the eye, a digitiser tablet is connected to an Archimedes to measure the area of the optic disc, located on the optic nerve at the back of the eye.

Also running on the Archimedes at the exibition was a selection of rehabilitation programs for patients recovering from head injuries. These have been developed at the Burden Neurological Institute, Bristol, for monitoring results and upgrading and adapting treatment.

Patients returning home are given a micro and modem so that exercise programs for regaining concentration can be undertaken and monitored remotely.

Ian Laurence, Acorn's sales and marketing director, presented a paper entitled Implications of Risc technology for the NHS.

The paper included a description of how Acorn's Risc developments can benefit the Health service.

Innovative entries are pouring in

ENTRIES already received for the 1988 Micro User Innovation Awards include an integrated package which manages all the administration associated with a continually assessed double option GCSE science course.

Also in the education field, another entrant uses the BBC Micro to help children with profound and multiple learning difficulties – children who cannot use the keyboard at all.

And in the commercial sector, a company has designed a program to cope safely and efficiently with the intricacies of high explosive storage.

The international competition is open to all BBC Micro users – individuals or groups, schools or businesses – and the project entered for consideration can be serious, commercial or just for fun.

In the BBC Micro category the winner will receive – among other prizes – an Archimedes, while the winner in the Archimedes section will take home a 24 pin Brother 1709 printer.

The closing date for entries is October 14 and the winners will be declared at the Electron & BBC Micro User Show in November.

DTP for ARC

ACORN Computers has signed a contract with British-based software house GST to develop a desktop publishing package for the Archimedes.

Scheduled for release towards the end of the year, the DTP software – based on GST's popular Timeworks package – will take full advantage of the machine's speed and graphics capability.

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Drive Swap Switch

For above makes external drive '0', internal drive '1'. Ideal for PC Emulator as 5.25" drive becomes A:Internal B: £8.00.

Drive Select Translation Cable

When used with above, interface links in external drive can stay set to '0', saves hassle when moving a drive from a Beeb. £9.00.

DFS Reader

This program will transfer the files on a DFS disk globally or selectively to an *Archimedes* disk quickly and simply. £15.00.

Monitor Switch Box

Archie/BBC. Plug both a BBC and an *Archimedes* into an *Archimedes* colour monitor. £10.00.

Archimedes <--> BBC RS423 link kit including file transfer software. £15.00.

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NEWS beat

Hospital wins in spreadsheet challenge

YOUNG patients at the Great Ormond Street Hospital in London have been given an Archimedes to mark an attempt at a new entry in the Guinness Book of Records.

Staged at the Electron & BBC Micro User Show the event involved an Archimedes and a brand new accounting software package from Minerva Systems called SigmaSheet.

The combination calculated a complete set of annual consolidated accounts for a company with 1,260 branches – covering nine financial categories including sales, costs, rents and expenses – in only 23.48 seconds.

Minerva (0392 37756) says SigmaSheet can calculate a 32-year cash flow in under 25 seconds and analyse figures for a period up to 333 years.

It all makes for a lot of paper – produced at the show was the longest spreadsheet in the world, all of 235ft long with up to 1,000 columns by 16 rows of figures.

Leading international accountancy firm Touche Ross pulled out of a challenge to compete against SigmaSheet and the Archimedes at the last minute.

"Maybe they discovered how fast our spreadsheet really is and didn't feel they had a chance of winning", said Minerva managing director Nova Fisher.

Despite the lack of a challenge the day did provide a winner – in the shape of the Wishing Well appeal fund at Great Ormond Street Hospital.

Acorn donated an Archimedes which will be used by children in the hospital to continue their education while undergoing long-term treatment.

Minerva Systems team wrapped in its 235ft spreadsheet left to right: Roger Jane, programmer of SigmaSheet, Barry Stearn, technical director, and Nova Fisher, managing director.

Mini modem for Z88

WEIGHING in at only 130 grammes, a miniature modem is the latest addition to the range of peripherals suitable for the Z88.

Available from Cambridge Computer (0223 312216) the battery-powered Z88 Pocket Modem is small – about the size of a cigarette packet – but offers a comprehensive range of features, including variable baud rates, choice of protocols and auto-dial and answer.

The modem is fully Hayes-compatible, with 300 and 1200 baud rates. It supports Bell 103/212A and CCITT V21/V22 communications protocols and can be switched between the two.

Price £172.45.

Arc aids athletes

AN Acorn-donated micro was the star attraction at a fund raising event for the British Olympic Appeal in Wales.

The Archimedes – fastest micro in the world – was a logical choice to raise money to speed British athletes to the Seoul Olympic Games.

Together with other prizes at a gala dinner and grand auction in the presence of the Princess Royal, it helped raise £56,000 for the appeal.

Alf Gooding, spokesman for the British Olympic Appeal, said: "It seemed entirely appropriate that a high performance British computer should help raise money for our althletes".

No hike in MicroLink charges

DESPITE this month's surprise Micronet/Prestel price rises, MicroLink has denied reports that it will be forced by BT into raising its own charges.

From July 1 Micronet/Prestel subscriptions go up 21 per cent from £66 to £79.95 a year for home users, with business users paying £119.95.

Peak time charges rise from 6p a minute to 7p, and free off-peak usage has been scrapped – users now have to pay 1p a minute. For the first time, full peak time rates also apply on Saturdays between 8am and 6pm.

However, although some communications industry observers are predicting that MicroLink will have to follow suit, the company says its annual subscription will remain at £36 for home and business users alike and it will continue to operate off-peak rates for the whole of Saturday and Sunday.

£1,000 competition winners

THE great £1,000 music competition sponsored by EMR in the April issue of *The Micro User* brought an absolutely massive response.

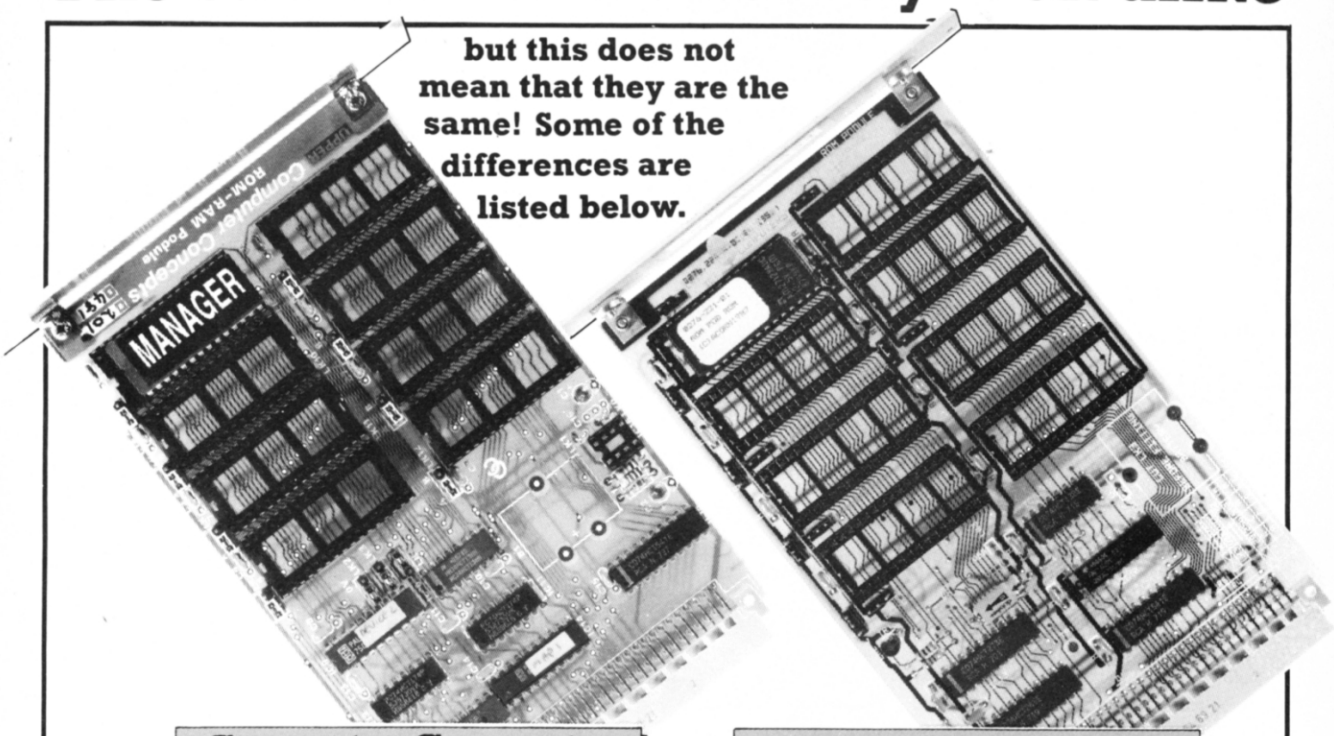
First correct entry out of the sack was from W.Stephens of Sudbury who wins the magnificent Farfisa TK80 digital keyboard. EMR's Scorewriter goes to S.Shaw from Stanmore, while the EMR Performer and Midi Interface were won by Ian Elson from London.

K.Milner from Knebworth; P.Sykes, Brighton; T.Pegg, Leeds and A.Highet, Granby each won the new music package for the Archimedes – Soundsynth.

Copies of Mike Beecher's book – Midi, Micros and Music – go to each of the 50 runners-up: D.Lally, Bromsgrove; S.Smith, Ormskirk; M.Smith, Aughton; R.Billington, Warley; A.Mas, Lower Kingswood; C.Stops, Bridgwater; S.Hubbard, Basingstoke; R.Grant, Sheffield; J.Marshall, Tollerton; N.Kennedy, Northwood; M.Needham, Sheffield; A.Gray, Ruislip; D.Radford, Bolton; A.Launchbury, New Barnet; R.Escolme, Nuneaton; G.Heayes, Woodhurst; T.Lancaster, Haverhill; F.Chaplin, Chorley; M.Pegg, Derby; A.Rogers, Bracknell; P.O'Leary, Worksop; T.Rowe, Welling; A.Barker, Watford; R.Masters, Gillingham; Q.Pak, Sevenoaks; P.Smart, Tunbridge Wells; N.Geeves, Wellingborough; J.Stone, Ivinghoe; A.Smith, London; J.Sawyer, High Wycombe; S.Crump, Chorley; K.Nelson, Patna; C.Williams, Coventry; R.Davenport, Iver Heath; W.Taylor, St Annes; R.Calvert, Newtownards; T.Lister, Salisbury; Z.Iqbal, Sheffield; A.Smith, Doncaster; S.Barber, Oxford; P.Robson, Lordswood; A.Smith, Long Eaton; M.Lancastle, Orpington; I.Braithwaite, Ruislip; H.Steel, Glasgow; S.Hardie, Ampthill; J.Sampson, Weybridge; M.Street, Biggin Hill; V.Barnett, Soton.

The two ROM boards may look alike

but this does not mean that they are the same! Some of the differences are listed below.



Computer Concepts	*Acorn*
7 ROMs maximum or	5 ROMs maximum
7 RAMs maximum	2 RAMs maximum
Supports 8k, 32k, 128k RAMs	Supports 32k RAMs
Complete ROM filing system	Limited ROM filing system
Automatic device type detection	Manual link device selection
Automatic device configuration	Manual command configuration
Fast file transfer (280k bytes/sec)	Slow file load (30k bytes/sec)
8 files open at once	1 file open at once
Complete RAM filing system	NO RAM filing system
Multiple boards extend RAM filing system	Not possible
896k RAM maximum per board	64k RAM possible per board
Price £49.00 + VAT	Price £59.00 + VAT

The potential for Archimedes software without a ROM podule is severely limited. There will be many ROM based programs in future, in addition to INTER-WORD, SHEET, CHART and SPELL-MASTER, which are already available. Remember, ROM based programs on the Archimedes still have many of the same advantages over disc based programs that they had on the BBC; programs load faster, they are more reliable, they are permanently available and, most important, such programs can use overlay techniques to save a large proportion of the available memory. Consider running a document processor, spelling checker, drawing program and perhaps a thesaurus; the total program size could easily be over 600K—totally impractical, even on a 1 Meg machine.

In addition the Computer Concepts' board can be used as a very fast RAM filing system, and our experience is that many boards are used for this. A program that uses the floppy disc intensively will gain from the RAM filing system, which is about 10 times faster than floppy.

Our board is fast, cheap, flexible, expandable and easy to use. We also provide a no quibble money back guarantee. In a comparison, the facts speak for themselves.

Please note: A backplane must be fitted in order to install any podule expansion card.

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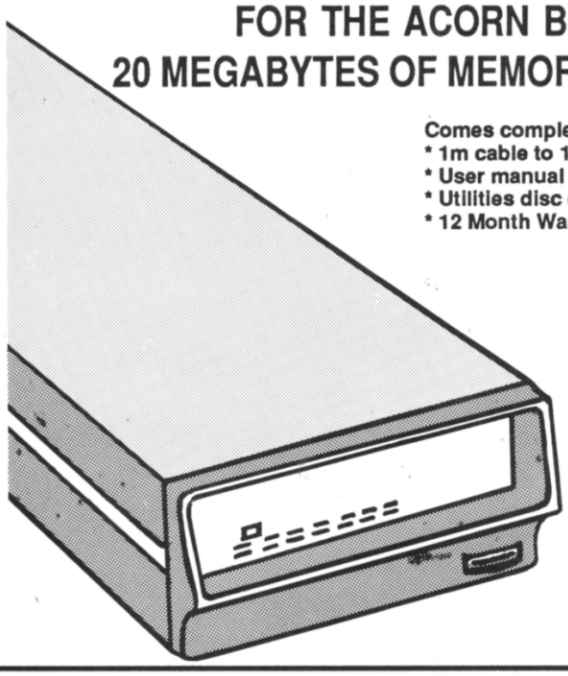

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20 Megabtye Full Height	£201.25
30 Megabyte Full Height	£287.50
40 Megabyte Full Height	£316.25

N.B. All drives have ST412/506 Interfaces except where specified

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PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II now also available for ARCHIMEDES

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

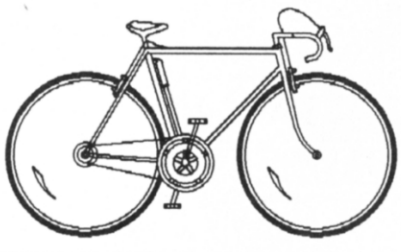
For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



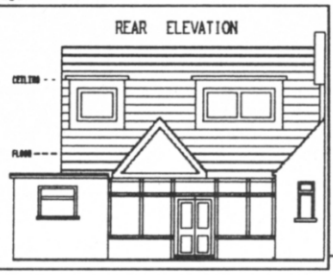


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc, ARCHIMEDES version on 800k 3.5" disc.

DIAGRAM II — £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

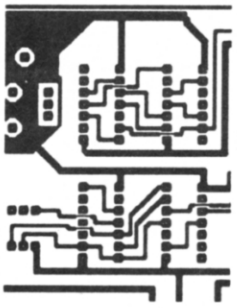
Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + VAT

Plotter Driver to suit most plotters £35.00 + vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A connection list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest!

You may specify which side of a board you wish the track to be on or leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins. Tracks may still be drawn manually at any time so boards may be produced by a combination of manual and auto techniques if required.

The program is in the form of a second Eprom and all the features are available even with an unexpanded model 'B' computer.

Please write or 'phone for full details.

COMPLETE AUTOROUTE PACKAGE (including manual eprom) £185.00 + VAT

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	**£ 60.00 + vat**
For Master 128 (with Pointer Rom)	**£ 60.00 + vat**
Bare Trackerball (no software)	**£ 49.00 + vat**
Pointer Rom - available separately	**£ 12.50 + vat**
Trackerball to mouse adapters	**£ 8.00 + vat**
Postage & packing on Trackerballs	**£ 1.75**

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT, *WIPE

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Access

REALTIME SOLIDS MODELLER

"Realtime Solids takes all the hard work out of truly impressive graphics displays on your BBC micro. It doesn't take much imagination or effort to create extremely complex shapes from very simple beginnings....full hidden line removal and hardly a trace of flicker" - BEEBUG (APRIL '88).

The complete 3D Solids/Wireframe package for architectural design, interior design, engineering design, teaching CDT and 3D geometry, molecular modelling, mathematical plots, scientific processing and high speed flicker-free 3D animation.

Hidden Surface Removal can be performed for full colour realistic solid displays at high speed. The 3D solid images can then be incorporated into other art designs.

Supports all plotters including HP-GL, Plotmate, Penman II, Hewlett Packard, Epson HI-80, Hitachi 672, Watanabe, Graphtec, Calcomp, Seckonic, Houston DMP, Roland and paper sizes from A0 to A4 for professional results.

The package consists of a 32k Realtime Graphics Language rom, Solids Design disc, Wireframe Design disc, Multi-plotter and printer driver disc, Demonstration disc, Applications disc, Database library disc and a fully comprehensive 150 page manual designed for complete beginners and experts alike.

Design facilities include 3D Solid/Wireframe Editors to design objects with lines and surfaces, create symmetrical objects by Sweeping or Extruding simple sections, use objects as building blocks to create more complex objects which in turn may be used as building blocks, specify individual surface and line colours for multi-coloured objects, dynamic 3D viewing in any graphics screen mode and a Data convertor for interfacing to other CAD systems and applications.

The Solids Realtime Graphics Language (RGL) rom provides 52 star commands to write your own 3D applications. The facilities include 3D Rotation, Scaling, Translation, Perspective and Isometric displays, Orbiting, 3D Turtlegraphics, Geometric processing, unique 35,000 pixels/sec line generator (faster than Acorn's 9000/sec) for high speed 3D animation and many more options.

The Solids RGL is compatible with all the BBC graphics screen, plotting and colour modes including Shadow screen and is up to 5 times faster than the original RGL. The 32k RGL rom board can be plugged into any 16k rom socket.

Minimum requirements: BBC B/keyboard/single drive. Also compatible with BBC B+, Master series, all versions of DFS & DDFS. The system will also take advantage of a 6502 2nd Processor/Turbo or AMX/QUEST Mouse. REALTIME SOLIDS MODELLER: £89.95.

	✓
Please send me further details.	☐
I wish to order:	
Realtime Solids Modeller (BBC).	☐
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3D CAD/Animation (BBC).	☐
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Super-Plot (BBC).	☐

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ARCHIMEDES & BBC VERSIONS

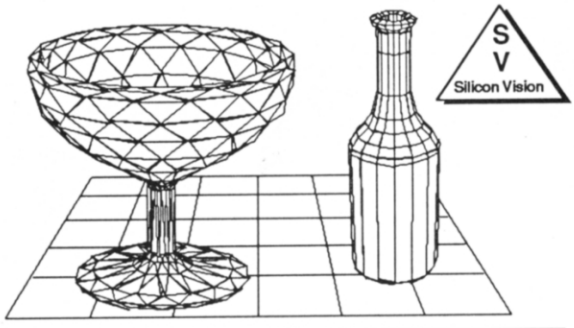
Once again Silicon Vision steals the lead with this incredible offer. It's true we're offering our international, best-selling wireframe 3D Graphics Development System (3D GDS) at an incredibly low price. No we haven't gone mad, it's simply our way of introducing you to our unbeatable 3D Solids Design & Animation Systems.

3D GDS is a full blown 3D CAD & Animation system that can handle wireframe models of any complexity. The package consists of a Design & Animation disc, a database disc to get you started, and a comprehensive 95 page manual. The standalone animation facilities for the BBC include a unique 30,000 pixels/sec line generator for high speed flicker-free 3D animation -ideal for games & simulations.

In the future, you may find that you need a 3D Solid Modelling system for more professional results or more powerful animation facilities for better effects.

Well, then you'll find no better company to do business with than Silicon Vision. As Europe's fastest growing CAD software house, there's no-one more capable of satisfying your future needs. In the meantime we offer you 3D GDS with our compliments. Worth over £25 it can now be yours for only £12.95 (BBC version) or £19.95 (Archimedes version). Super-Plot plotter driver: £15.95 (BBC).

Minimum requirements: BBC B/single drive. Also compatible with BBC B+, Master series, Archimedes 305 to 440, all versions of DFS, DDFS & ADFS(Archimedes 3.5" disc). Order one today and enter the dynamic world of high speed 3D computer graphics.



SUPER-DUMP

1920x1024 Resolution Breakthrough! Near Plotter Quality hardcopy at a fraction of the cost.

At last a printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible printers to provide 1920x1024 resolution as opposed to the 640x256 resolution limitation of most printer dumps.

Fully compatible with the Realtime Solids Modeller, 3D GDS and all other CAD packages and applications that can produce a VDU text file of a screen image. An example program is included in the package.

Unlike other printer drivers, Super-Dump does not use screen images directly but instead operates on text files of VDU codes that represent the image to be printed. These files can also be created by your own graphics programs with the addition of two simple *SPOOL statements.

The package consists of a Super-Dump disc complete with documentation and provides fully proportional dumps at resolutions of 1920x1024, 640x512 & 640x256. Images can also be scaled, positioned and previewed before printing.

Minimum requirements: BBC B/single drive. Also compatible with BBC B+, Master series, all versions of DFS & DDFS. SUPER-DUMP: £15.95. (Enquire for Archimedes version).

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Z88 Cambridge Computer

(as reviewed in December 87 Beebug)

To introduce the new Z88, we are able to offer Beebug members the Z88, 128K RAM pack, Mains adaptor, and a special Z88 to BBC file transfer package for a total price of

£347.40 incl. VAT

(BBC to Z88 Transfer package, worth £24.95, free of charge.)

Stock code 0840F

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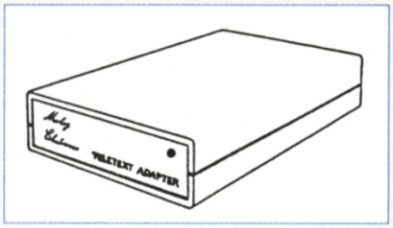
TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.
The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer



(no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:

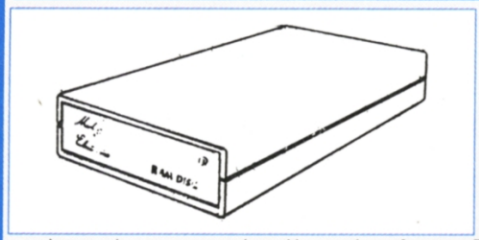
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*

". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*

". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*

THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

RAMDISC

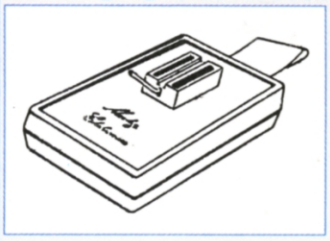


Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.
These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.
QUADS–also available quad cartridges, specifications as Duels but 4x16k ROM's.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

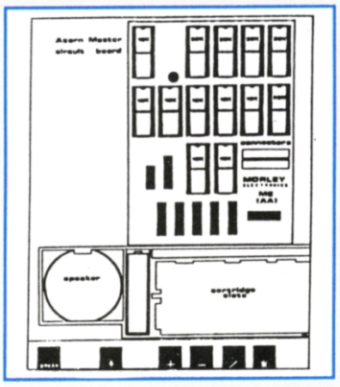
BUILT IN FEATURES (at the press of a button)

Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'



At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

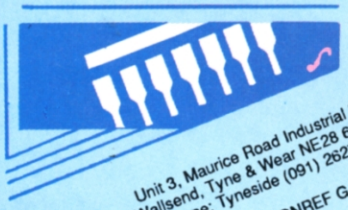
A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

MORLEY ELECTRONICS



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(Quoting Mag 70211)

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

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	Note Teletext Adapters for Master Compact	138.00	(a)

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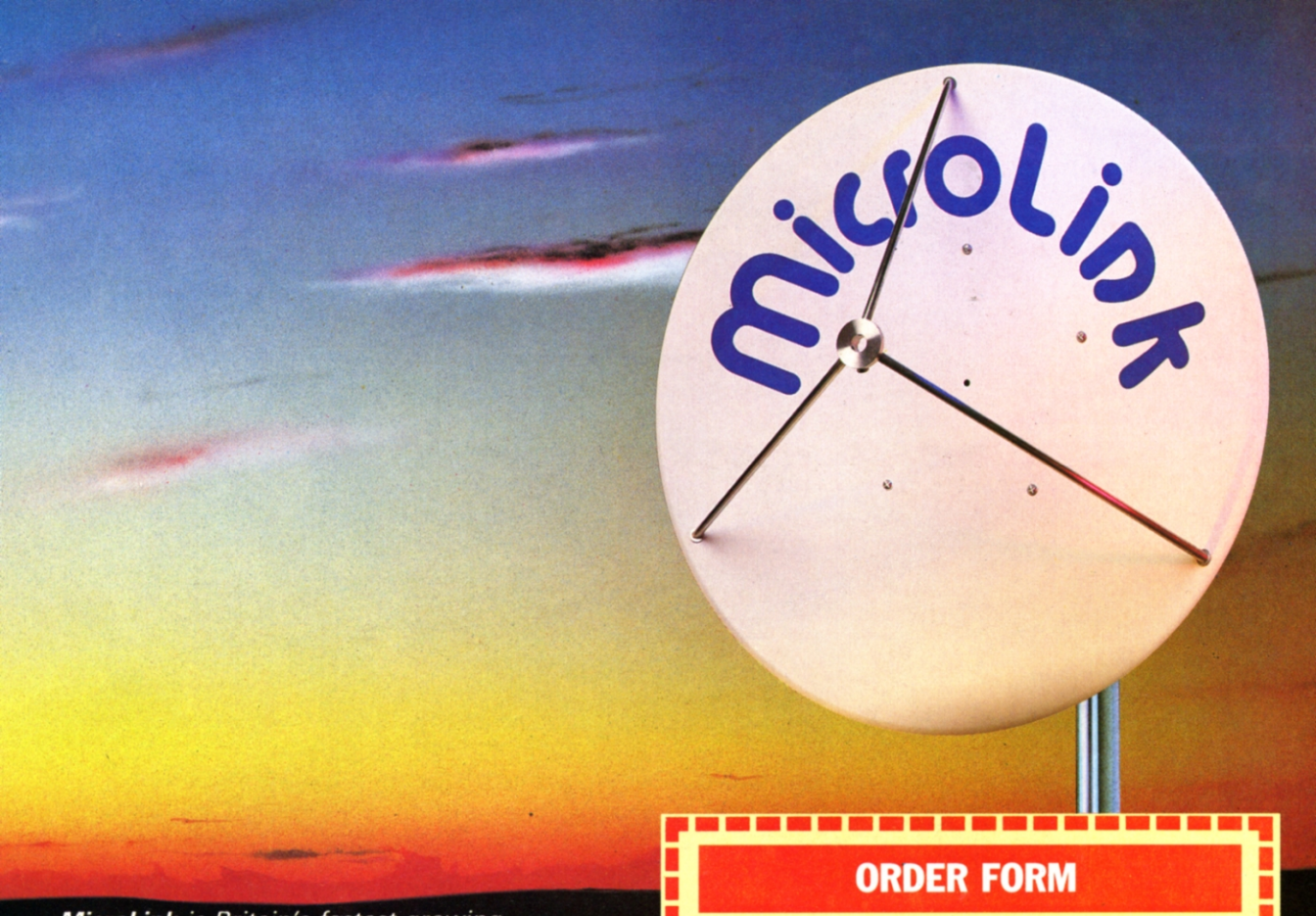

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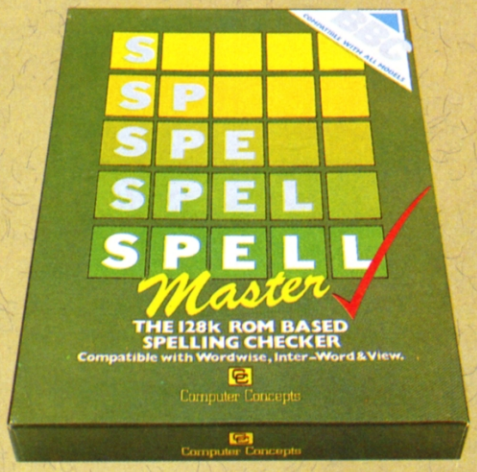

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PROGRAM Library No.18

Compiled by Steve Turnbull

WE get lots of Library routines and can't use them all, but we do hang on to the better ones until a space is available – so keep sending them in. This month we have a number of interesting routines including a little program to enter your favourite program editor when an error occurs – very useful as you develop your own routines.

On the 6502 front there is a complete 100-byte language for BBC B and B+ to combat the lack of No Language Environment of the Master. And finally there's a machine code routine to tidy up the format of input strings.

Title: String Tidy
Language: 6502
Author: Richard Owen

Getting someone to give your program input in a particular format is difficult. One solution is to write your own routines which force correct input, but even then a name could be entered like this:

```
RICHARD q OweN
```

or:

```
rIcHArd q. oWEn
```

...the possibilites are endless. The routine given here will take a string and convert it to standard upper/lower case format:

```
RQ. Owen
```

It works by scanning through the string and setting a flag, *caps*, each time it comes across one of the punctuation marks – *PUNC* – in its list.

Each letter encountered is first forced to lower case and then, if the flag is set, is changed to a capital.

All you do is set up a buffer, put the string into it with:

```
$buffer=s$
```

then call the routine with the address of the routine in *X%* – low byte – and *Y%* –high byte. You can change the way the string is formatted by altering the contents of *punc$*.

```
 10 REM String Tidy
 20 MODE7:PROCdeclare
 30 PROCassm:PROCtest:END
 40 DEFPROCdeclare
 50 DIM code 256,buf 256
 60 punc$  =":,.- _"+CHR$34
 70 ptr=&70:caps=&72:ENDPROC
 80 DEFPROCassm
 90 FOR L%=0 TO 2 STEP 2
100 P%=code:[OPT L%
110 .stringTidy
120  STX ptr:STY ptr+1
130  LDY #&FF:STY caps
140 .tidyLoop
150  INY:LDA (ptr),Y
160  CMP #13:BEQ endTidy
170  CMP #ASC"A":BCC notLetter
180  CMP #ASC"Z"+1:BCC isLetter
190  CMP #ASC"a":BCC notLetter
200  CMP #ASC"z"+1:BCS notLetter
210 .isLetter ORA #&20
220  BIT caps:BPL notCapital
230  AND #&5F
240 .notCapital STA (ptr),Y
250  LDA #0:STA caps:JMP tidyLoop
260 .notLetter LDX #LEN(punc$)
270 .scanLoop CMP scanStart,X
280  BNE notFound:LDA #&FF:STA caps
290  JMP tidyLoop
300 .notFound
310  DEX:BPL scanLoop:JMP tidyLoop
320 .endTidy RTS
330 .scanStart OPT FNs(punc$)
340 ]:NEXT:ENDPROC
350 DEFFNs(s$):$P%=s$:P%=P%+LENs$:=
L%
360 DEFPROCtest
370 REPEAT INPUTLINE"Line:"$buf
380 X%=buf:Y%=X%DIV256:CALLstringTi
dy
390 PRINT$buf":UNTIL FALSE:ENDPROC
```

Get it right!

```
 10 =    0 0 | 140 = EC08 D | 270 = 4D5A 3
 20 = A4E9 9 | 150 = 9A17 E | 280 = 8EA0 E
 30 = CEB3 A | 160 = A87C 9 | 290 = D6A4 6
 40 = 5EC5 9 | 170 = DEFB 3 | 300 = DBC2 9
 50 = 3E42 0 | 180 = 734F 6 | 310 = 3391 9
 60 = ADC9 F | 190 = 98EF 6 | 320 = 102F E
 70 = 3E93 7 | 200 = 951D 7 | 330 = BCF2 3
 80 = DF1D 5 | 210 = C61F A | 340 = 953B D
 90 = AAB9 F | 220 = 6228 6 | 350 = 1F5E 0
100 = 7CBB 7 | 230 = 9602 1 | 360 =  A24 3
110 = 34D5 0 | 240 = 8F21 6 | 370 =  758 1
120 = A2F4 1 | 250 = ED8D D | 380 = 1A56 A
130 = D8A4 F | 260 = C601 0 | 390 = 8663 3
```

Title: No Language Environment
Language: 6502
Author: Michael Firth

In response to the letter by Ben Byram-Wigfield in the November 1987 issue of *The Micro User* about the lack of a No Language Environment mode on the BBC B and B+ here's a routine that provides one.

To work the code needs to input lines and feed them to the command line interpreter. It also has to generate an *Escape* error if Escape is pressed while inputting text and handling errors generated by the rest of the system. In fact the utility represents the minimum requirements for any language for the BBC Micro.

Although the routine is assembled at &900, it is quite logical for it to be located anywhere from &400-&6FF, or even in page zero, as it is only &64 bytes long. From here you can extend it as far as you like.

```
 10 REM NLE Emulator
 20 PROCinit:PROCassem
 30 PROCsave:CALL NLE:END
 40 DEF PROCinit
 50 oscli =&FFF7:osbyte=&FFF4
 60 osword=&FFF1:oswrch=&FFEE
 70 osnewl=&FFE7:code  =&0900
 80 data  =&0700:brkv  =&0202
 90 errptr=&00FD:ENDPROC
100 DEF PROCassem
110 FOR L%=0 TO 2 STEP 2
120 P%=code:[OPT L%:.NLE
130  LDA #ASC"N":JSR oswrch
140  LDA #ASC"L":JSR oswrch
150  LDA #ASC"E":JSR oswrch
160  JSR osnewl:JSR osnewl
170  LDA #error MOD256:STA brkv
180  LDA #error DIV256:STA brkv+1
190 .main_loop LDX #&FF:TXS
200  LDA #ASC"*":JSR oswrch
210  LDX #parblk MOD256
220  LDY #parblk DIV256
230  LDA #0:JSR osword:BCC DoCLI
240  BRK:OPT FNb(17)
250  OPT FNs("Escape"):BRK
260 .DoCLI
270  LDX #data MOD256
280  LDY #data DIV256
290  JSR oscli:JMP main_loop
300 .error
310  LDA #126:JSR osbyte
320  JSR osnewl:LDY #1
330 .errlp
340  LDA (errptr),Y:BEQ errend
350  JSR oswrch:INY:BNE errlp
360 .errend
370  JSR osnewl:JMP main_loop
380 .parblk
390  OPT FNw(data):OPT FNb(255)
400  OPT FNb(32):OPT FNb(126)
410 ]:NEXT:ENDPROC
420 DEF FNb(B%):?P%=B%:P%=P%+1:=L%
430 DEF FNw(W%):!P%=W%:P%=P%+2:=L%
440 DEF FNs(s$):$P%=s$:P%=P%+LENs$
:=L%
450 DEF PROCsave:PROCoscli("SAVE N
LE "+STR$~code+" "+STR$~P%):ENDPROC
460 DEF PROCoscli($&700):LOCAL X%,
Y%
470 Y%=7:CALL oscli:ENDPROC
```

Get it right!

```
 10 =    0 0 | 170 = 956E E | 330 = A685 D
 20 = 597F F | 180 = DBC1 C | 340 = 420C 8
 30 = D6D4 A | 190 = DFC2 B | 350 = F147 0
 40 = 40D7 F | 200 = 6464 2 | 360 = C2E3 7
 50 = 665E B | 210 = 2879 F | 370 =  A79 9
 60 = 5215 7 | 220 = BE70 F | 380 = 63F3 C
 70 = 32DD E | 230 = CFE4 B | 390 = 9FC4 9
 80 = 9079 C | 240 = 7426 D | 400 = F697 7
 90 = 8E8E 4 | 250 = 82B5 5 | 410 = 953B 5
100 = B623 B | 260 = 7548 7 | 420 = 9BB4 1
110 = AAB9 8 | 270 =  9D2 A | 430 = EAA2 F
120 = F05B B | 280 = E7CF 2 | 440 = A3C2 3
130 = 1671 7 | 290 = 300F 1 | 450 = 1A8F 6
140 = 9CB7 7 | 300 = D394 B | 460 = 1C6E 4
150 = D28E 5 | 310 = F227 D | 470 = 7002 1
160 = 495D C | 320 = 8E31 3 |
```

Title: Error correction
Language: Basic
Author: Keith McDowell

After an error report you usually list the appropriate line. By adopting the technique shown in the accompanying program you can get your micro to automatically enter in the appropriate command for you.

It works by using the *FX138 command – via CALL &FFF4 – to insert the necessary key presses into the keyboard buffer. Then, for tidiness, it switches off the screen drivers – with VDU21 – while the line is processed, and switches them back on to list the line – using CHR$6.

With:

```
??? PROCout("LIST "+STR$ERL+CHR$6)
```

or:

```
??? PROCout("EDIT "+STR$ERL+CHR$6)
```

or something similar, you can alter the command string to invoke a built-in editor if you have one.

```
 10 REM Error correction
 20 REM by Keith McDowell
 30 ON ERROR MODE 7:PROCerror
 40 Silly mistake
 50 END
 60 DEF PROCerror:VDU7,4:*FX4
 70 REPORT:PRINT" at line ";ERL
 80 PROCout("L."+STR$ERL+CHR$6):END
 90 DEFPROCout($&700)
100 LOCAL A%,L%,X%,Y%:A%=138
110 FOR L%=0 TO LEN$&700:Y%=L%?&700
120 CALL&FFF4:NEXT:VDU21:ENDPROC
```

Get it right!

```
 10 =    0 0 |  50 = FD2E 3 |  90 = BA9F A
 20 =    0 0 |  60 = EFD0 0 | 100 = F5DF 2
 30 = 868F F |  70 = 6BDF E | 110 = 5DA6 4
 40 = F92E 7 |  80 = CEDF 5 | 120 = FF32 2
```

THIS series is devoted to explaining all the things about your BBC Micro that you never knew – or may have since forgotten! If there's something you want to know about getting the best out of your micro, or if you just want some of the more puzzling code explaining, write to: Mike's Micro Memos, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

"It came as no surprise to learn that the so-called random number generator in my BBC Micro was anything but..."

Random thoughts

IF there's one thing I've learned about life it's that it's definitely not random. Despite the best efforts of my maths teachers, I know for certain that buses arrive in pairs, bills come in threes, toast inevitably lands butter-side down and I'm always left with the Q and Z at Scrabble. So it came as no surprise whatsoever to learn that the so-called random number generator in my BBC Micro was anything but.

The idea of random numbers is simple enough. Every time we throw a die we're generating a random number between one and six. At least we assume it's random – that is, each number is equally likely to come up – though my seven-year-old cottons on quickly enough when I try to use my non-random die in Snakes and Ladders.

Of course a die doesn't have to have six sides – it could have four or even 20 giving you random distributions of the numbers one to four and one to 20 respectively. Wargamers and adventure role-players use dice like these all the time.

BBC Basic takes the idea several steps further, allowing you to generate random numbers over wide ranges of numbers, integer or decimal. This is very useful for introducing the chance element into games and simulations.

It uses the keyword RND, a function which returns an integer between –2147483648 and 2147483647. Try:

```
PRINT RND
```

repeatedly – you could put it in a loop or define a function key – and you'll see you get different numbers each time, such as:

```
 68153343
2.09662776E9
1.04851149E9
```

The E, by the way, means that the number before it should be multiplied by 10 to the power of the number after it. This notation is used for rather large values. As with other functions, you can assign the value of RND to a variable:

```
number=RND
```

Using RND like this, though, is rather cumbersome: There's not much call for a number like 68153343 in a game of Snakes and Ladders. Fortunately we can give RND a parameter in brackets. For instance:

```
PRINT RND(6)
```

will give you random whole numbers in the range 1 to 6 inclusively.

Generally RND(X) – where X is a whole number greater than one – will give you an integer in the range 1 to X. Notice that *greater than one*. If you were to use RND(1) you'd still get a random number, but this time it's any decimal in the range 0 to 0.999999.

In practice you'd use statements like:

```
number=10*RND(1)
```

to give a decimal range from 0 to nearly 10. RND(0) is also a special case: It repeats the number that RND(1) last gave you, so in a sense it isn't random at all. This comes in handy when you're trying to debug programs. You see, sometimes when you're using random numbers it's hard to tell whether you're constantly varying and erroneous output is due to the laws of probability or your own inept programming. By using RND(0) to repeat the last RND(1) you can weigh

TIP *When you're debugging a program that involves random numbers add a line with a negative seed at the beginning. That way you generate the same sequence of numbers each time you run it. With luck, this "predictable randomness" will show you where you're going wrong – or at least where you aren't!*

the odds a bit more heavily on your side.

The trouble is, though, the numbers RND gives aren't random – they can't be. Think about it: A computer can only do as it's told, following a fixed sequence of instructions or program.

Somewhere inside the Basic rom there's a machine code program telling your BBC Micro how to generate your numbers. If you could decode that program you could work out the pattern and use it to predict the next number.

It's like telling a robot how to shuffle cards – if you know the sequence they're in at the beginning you'll know what they are at the end. Having said that, the shuffle the BBC Micro uses to generate its numbers is pretty clever so there's not much bias in the spread.

Unfortunately, the number it starts to shuffle at power-up – known as the seed – is always the same. This means that from switch on the sequence of random values is the same. The following program demonstrates this.

```
20 FOR loop=1 TO 5
30 PRINT RND(6)
40 NEXT
```

Save it, then CHAIN it from power-up a few times. I always get 6,6,1,1,3. Not very random! We can get round this, though, by altering the seed number. To do this we use the negative of our new seed in RND. For instance – picking a number *at random* – let's make 123456 our new seed by adding line:

```
10 dummy=RND(-123456)
```

Notice that now when you run it you still repeatedly get a fixed sequence – but at least it's different to the first. Change the seed and you change the sequence – *dummy* is just a waste variable to allow us to use RND.

And that gives us the idea for making our random numbers truly random ... nearly. We just use the *pseudo-variable* TIME to give us a seed that we're unlikely to be able to predict. This gives us the following program:

```
10 dummy=RND(-TIME)
20 FOR loop=1 TO 5
30 PRINT RND(6)
40 NEXT
```

If you really wanted to make things random, you could set TIME using a keypress – on the grounds that there's no way you can be sure how a human will respond.

*INFO Info

ONE of the disc system's exotica is the *INFO command. Basically it's a super *CAT command telling you as usual the files on a disc, the directory they're in and whether they're locked or not. That's straightforward enough. It's those four numbers after all this that are problematical....

Well, first of all, they're in hexadecimal, so don't panic – we covered that last month. Here are their meanings one by one:

Load address: The first value shows the address in memory the file will be loaded to. For instance, &FF1900 means that – like most Basic files – this file will load on top of PAGE which is &1900 on my DFS. A machine code file might load to &900.

Execution address: Just because you've loaded a file at one address, it doesn't mean that the machine code routine that the operating system should use to run it shares that address. For a Basic II file the execution address is &FF8023, the initialisation routine of the Basic rom.

Our putative machine code at &900 might have its first few bytes taken by data, so that its execution address could be &906. If, like a saved screen image, the file has no realistic execution address, the second number merely echoes the start address.

Length: Measured in bytes, this is exact – 000006 bytes means six bytes, not seven.

Start sector: Your disc drive is divided into rings, or tracks. These tracks are themselves divided into sectors, each holding 256 bytes. The DFS uses these sectors as minimum units, so a 257 byte file would use two sectors.

Files are saved in successive sectors, so all the DFS needs to know is which sector – beginning with sector zero – the file starts at.

Extra info

NOTICE the &FF in the &FF1900 start address of the Basic file. This is actually the DFS abbreviation of the full &FFFF1900. The &FFFF is to distinguish the I/O processor (your standard BBC Micro) from the equivalent second processor address – &00001900 or &1900 for short.

```
$.DEMO      L   FF1900 FF8023 00012B 030
$.CODE          000900 000900 000006 02F
$.SCREEN        007C00 007C00 000400 02B
```

The above figure shows the part of the output of a *INFO *.* on a disc after the accompanying demo program is run and saved as the locked file DEMO. It shows three types of file:

- DEMO: A Basic II program running in the I/O processor.
- CODE: A six byte machine code program poked into memory at &900. Enter CALL &900 to see what it does. Notice that, because the *SAVE doesn't specify the &FFFF prefix for the I/O processor, this isn't shown.

```
  10 REM Demo program
  20 MODE 7
  30 PRINTTAB(14)CHR$141CHR$129"Demo"
  40 PRINTTAB(14)CHR$141CHR$132"Demo"
  50 *SAVE screen 7C00 8000
  60 !&900=&EE2007A9
  70 !&904=&60FF
  80 *SAVE "CODE" 900 906
  90 PRINTTAB(2,22)CHR$141CHR$129"Now
SAVE this program as DEMO"
 100 PRINTTAB(2,23)CHR$141CHR$132"Now
SAVE this program as DEMO"
```

- SCREEN: Enter Mode 7 and you should be able to *LOAD SCREEN.

Note that the actual sector numbers will vary

Turn to Page 29 ►

TIP

The most usual form of the command *INFO is:

```
*INFO *.*
```

which displays all the files in all the directories. To display only those, say, in the route ($) directory use:

```
*INFO $.*
```

and to display all the files on drive one the command is:

```
*INFO :1.*.*
```

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◀ From Page 27

depending on how much is already on the disc. The difference between them, however, will stay constant as the number of sectors used is fixed by the file size.

*OPT option

*IF you enter *OPT 1 1 from then on each time you access a file on your disc you'll be shown the same data as you'd get from a *INFO.*

*Enter *OPT 1 0 to turn this effect off.*

Giving commands

WE'RE all familiar with star commands, which go straight to the BBC Micro's operating system for processing. In fact it would be virtually impossible to work without *CAT, *SAVE and the ilk. Sometimes, though, this star system can be a little restricting. For instance:

```
*LOAD Screen
```

is acceptable, but if you try:

```
*LOAD screen$
```

you're in trouble – star commands can't handle variables. This is a pity because, for instance, *screen$* might be the input from a menu of pictures.

Fortunately you can get round this by using the Operating System's Command Line Interpreter – oscli – routine. The accompanying program shows a procedure – PROCoscli – which handles things: The full star command is passed as a string variable – *star$*. Of course this string itself can be built up of strings. For instance, the coding for the screens problem could run something like:

```
star$="*LOAD "+screen$
```

If you've got Basic II you won't need PROCoscli as it's been incorporated as the standard function OSCLI. Again you pass a string as parameter so line 70 in the listing becomes:

```
70 OSCLI(star$)
```

and lines 100 onwards are defunct.

```
10 REM ==================   100 REM ================
20 REM === OSCLI DEMO ===   110 REM === PROCoscli ===
30 REM ==================   120 REM ================
40 MODE 7                   130 DEF PROCoscli(S&700)
50 REPEAT                   140 LOCAL X%,Y%
60 INPUTLINE"*"star$        150 X%=&700 MOD 256
70 PROCoscli(star$)         160 Y%=&700 DIV 256
80 UNTIL FALSE              170 CALL &FFF7
90 END                      180 ENDPROC
```


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FOR the past five years I have been a confirmed View user. Would any new product induce me to change from the word processor which had become second nature? Well, View Professional did. I do not often use spreadsheets and my first reaction to View Professional was to wonder if I wanted a word processor which looks like a spreadsheet.

In fact, the columns of the screen layout provide very powerful tabulation functions for the word processor, all the usual features of a spreadsheet and the sorting of entries normally associated with a database.

For once, here's a truly comprehensive package for all models of the BBC Micro from Model B to Compact – the plastic slipcase contains a 5.25in DFS disc, a 3.5in ADFS disc, two 16k roms and a 192-page guide which is relatively easy to understand.

There are images of the two roms on disc which you can use if you have two banks of sideways ram. There is also a disc-based second processor version which runs on the Master Turbo – but with no extra bytes free – and it runs on the Archimedes 6502 emulator without modification. However, an enhanced Archimedes version – PipeDream from Colton Software – is also available.

Yet other versions of the same program, also called PipeDream, is available for the PC and is built into the Z88.

View Professional is a wysiwyg word processor with spreadsheet-defined expressions. When you first enter it you are in the equivalent of the View edit mode and ready to enter text. The rows are numbered and the ruler at the top of the sheet is laid out with alphabetically headed columns, though both can be switched off.

The width of each column on screen can be altered and in addition each has its own definable wrap width which determines the point where whole words are carried on to the next line.

By default the wrap width of all the columns is set to the end of the row, allowing you to type in continuous lines of text across the screen. If you define the wrap width to extend for only one column or a few columns you can type in multi-column text on the same page.

Page layout – with top, bottom, header and footer margins – is not found on the edit sheet screen, pressing Escape puts you on the options page shown in Figure II. The bytes free, filename and printer driver currently loaded are all there, together with the definitions for page layouts, headers, footers, formatting, justification and many other powerful features.

This options page should not be confused with View command mode – it conveniently keeps all these features off the main screen and allows easy re-definition at any time. Page settings are saved with the text, enabling you to load in a personalised layout at the start of session.

The major disadvantage of the options page system is that definitions cannot be redefined in the middle of a page or file, so you can't change to double line spacing for a table halfway down a page. However, the option page settings are independent for each file and can differ for each part of a multifile document.

The 85 commands can be entered from the edit screen by prefixing a one, two or three character mnemonic with a backslash; the cursor then jumps to a command window at the top of the screen where the command is entered. A unique feature is that all commands can be assigned to any of the three tiers of function keys.

Many of the default definitions are identical to the fixed set of View and where the keys are different, a !BOOT file containing your choice can increase the coincidence with View keys. Preceding key definitions with *FX228,176 allows a fourth tier of definitions accessible by Control+Shift+function key.

Each file is formed from spreadsheet cells or slots formed by the intersection of rows and columns. These are normally text slots for word processing, but they can be expression slots – users of spreadsheets will be familiar with this concept.

Any mathematical expression can be placed in an expression slot and the screen display will show the result of evaluating the expression. All

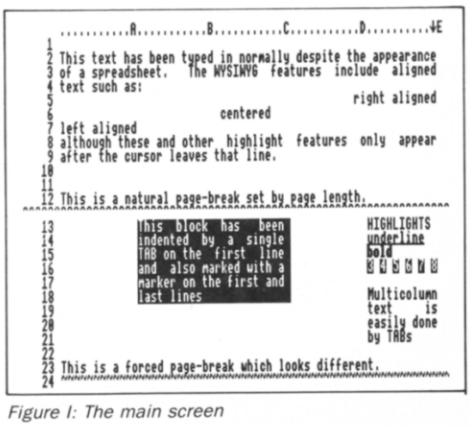


Figure I: The main screen

Points for

- Powerful word processor
- Spreadsheet features
- Sort facility
- On screen highlights
- Comprehensive manual
- Pipedream compatibility

Against

- Expensive
- Whole file page layout only
- No macros

the usual functions are available such as number format, left/centre/right alignment and decimal places.

The options page allows leading or trailing characters defined by the user to be added to an expression slot or block of slots. For example you can add pound or percentage signs – the defaults – or character strings such as *a.m.*, *pm* or *mins*. This facility is very useful for large tables or lists to which these prefixes or suffixes can be added by a single block command.

The database facilities are limited and amount to a sort routine that operates on any marked block of text, numbers or dates. All the entries on one row can be sorted into ascending or descending order. An example would be a table with columns of names, ages and birth dates separated by tabs. The name column can be sorted into ascending or descending alphabetical order and the corresponding entries in the other two columns on the same row would be carried with the name.

Blocks of text or numbers are delineated with markers set at the beginning and end of the chosen section by a single command. The marked block is highlighted by reversed video characters on the screen, which you can see in Figure I. However, you can only highlight complete columns, which can be troublesome when copying, moving or deleting text, since most is written in the first column.

To mark a block which starts part way along a line it has to be split at the chosen place and the cursor moved down the next line, which now contains the split part of the line, which is then marked. This has to be repeated if the text at the end of the block also lies in the middle of a line. Finally, the revised paragraph has to be reformated to remove the gaps caused by the split lines.

A major feature of View Professional is the power of the Tab key. Pressing it jumps the cursor to the next column of the sheet – Shift+Tab to jump back. The cursor then remains indented to that column. This is a much simpler way of indenting paragraphs than the setting of multiple rulers used by View.

One disconcerting feature is that if you have typed across the page in column A and then Tab to column B, all the column A text vanishes – although it re-appears when you Tab back. Another source of confusion to the novice is that inserting and deleting lines or rows only applies to the column the cursor is in.

In an otherwise excellent package, View Professional has one shortcoming which still sends me back to my old faithful View – it cannot perform macros. An example of a macro would be a standard letter which contains windows into which personalised details, such as name and address, can be fed automatically – different

Turn to Page 32 ▶

```
          Page 2              Insert
          Free 26250
          File REVFIG2
       Printer D.EPSON

         Title This text can be inserted into document using @T
Insert on wrap R
  Text/numbers T
       Borders Y
       Justify Y
          Wrap Y
Calc: Auto/man A
  Columns/rows R
Decimal places 2
Minus/brackets M      Margins: Top 0
     Lead chs. `              Header 0
    Trail chs. %              Footer 0
  Line spacing 1              Bottom 0
   Page length 60               Left 0
    Start page 1
       Header ///Review/
       Footer //Page @P@@/
```

Figure II The options page

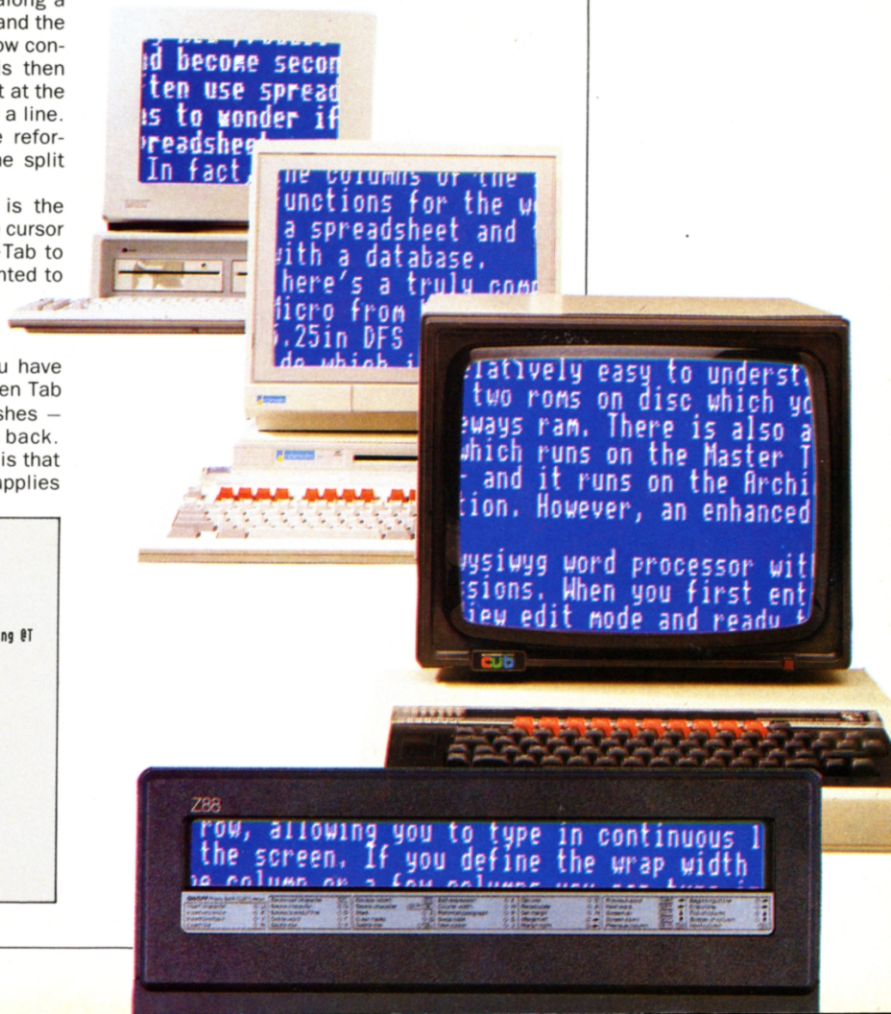
MICRO COMPATIBILITY

PipeDream from Colton Software – 0945 211472 – is built into the Z88 and now also available for the Archimedes and PC. These versions are all very similar to View Professional but have more menu control, dialogue boxes and other enhanced features.

The Archimedes will run both View Professional and PC PipeDream on the appropriate emulator, but the Archimedes version is faster and has several extra features such as more spreadsheet functions.

One very important feature of the software is that the file structure is compatible on all versions; the Archimedes and PC versions even have built-in import and export facilities. So passing files between micros and using them in their new environment has never been easier.

View Professional and PipeDream are the ideal choices for anyone who uses more than one type of micro.



◀ *From Page 31*

details appearing in each copy of the letter.

The nearest that this package comes to performing a macro is the ability to transfer the details of a slot into the text of a document using an @-field. This can be done by entering a slot reference, such as column A/row 19 into the text with:

```
@ A19 @@@@@@
```

The trailing @s indicate the size of the field, six characters in this case, so that the text can be formatted and justified correctly following the insertion. The @-sign can also be followed by a P, D or T to insert the page number, day and date – on machines with a built-in clock – or title of the piece respectively.

In the final outcome any word processor is only as good as its printer driver – that software patch which interprets text highlights into codes the printer understands. The printer driver that comes with View Professional is limited to eight highlights, which are entered into the text with a highlight command followed by a number. It is possible to use View printer drivers with View Professional provided you stick to combinations of *h1* and *h2* which correspond to the View codes.

The disc supplied contains two ready-defined printer drivers, FX80 and JUKI610 for Epson and Juki-compatible printers and also a printer driver editor so you can define your own. I successfully produced drivers for the Hewlett Packard Laserjet Plus and IBM Proprinter XL modes of my Brother HL-8 laser printer.

However, I continued to be frustrated by the limit of eight highlights until I acquired the latest printer driver rom, Hyperdriver, from Dabs Press. This allows any number of printer driver codes to be defined from View or View Professional.

Last year Acorn was developing an enhanced version of View Professional to run on the Arthur operating system of the Archimedes but I was very disappointed to hear that in January this project had been dropped. However, Colton Software, the original author of View Professional, has developed the fully-fledged Archimedes version which is available now. Not only that, the Archimedes also runs Colton's PC version on the PC Emulator.

Up to now View Professional has not been a big seller, probably due to its cost. But all that is now changing, as in its PipeDream guise it is being introduced to other micros. The full file compatibility between View Professional running on my Master or Archimedes with PipeDream on the Z88 was a major factor in my changing from View and buying a Z88. Buying a serial cable to connect the two micros has provided me with a truly portable word processor.

View Professional is an under-rated and under-promoted package which deserves more serious consideration and a far wider usage.

The bottom line...

Definitely for the serious user, but easy to use and better than View

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How to join:
Phone 0625 878888

SOFTWARE SCENE

DESKTOP GAMES ... bit of a puzzle

Price: £5.95 (3.5in disc, mail order only)
Supplier: Gem Electronics, 17 Tandragee Road, Portadown, Craigavon, BT62 3BQ

WHEN the press release announcing this product arrived at *The Micro User* office, we couldn't believe the gall of anyone proposing to sell a sliding block puzzle, solitaire and a Mastermind game for the Archimedes – particularly when such things are so easy to write as short magazine listings. But we should always look before we leap.

The games run on any Archimedes except a 305 and running the program is simply a case of Shift+Break. There's a short delay marked only by a Desktop Games v2.1 message and finally the icon bar appears at the bottom of the screen. Except that instead of being a pleasant cream colour it's now dirty pink and there are three new icons – a star, a pair of headphones and a little space invader with the word Logic above him.

Clicking the star gives instant access to operating system star commands and the headphones bring up a volume control in the form of a slider – like the palette. Both are useful additions to the desktop.

Clicking the space invader produces a menu of three games: CrakCode, Slider and Leapfrog. Each appears in fixed-size windows which continue to work perfectly even if partially obscured. In addition, if you remove a game window and then restore it you get back to the position you were previously at. And if you're feeling really macho you can play all three at once.

CrakCode gives a very nice representation of the original Mastermind game board with 10 rows of four large holes in a row, with a square of four small holes at the side for the answer code – and seven colour blocks along the bottom.

The idea is that the micro selects four of the seven colours in some combination and you have 10 goes to figure out what that is. You play by clicking a colour and choosing the position you want to play; the selection also sounds a note so if you're bored you can play a tune.

When you successfully work out the choice and order of colours, a not entirely happy smiley face appears at the top with the corresponding code. Pressing the menu button over the board produces a list of options to allow colours to be repeated, leave gaps – effectively another colour, give the answer – which produces an unhappy face – or restart.

Slider is the sliding block puzzle. The picture occupies about one quarter of the screen and is complete. Pressing the middle button on the mouse brings up the menu with options allowing different grid sizes, three levels of difficulty, the chance to load a different picture, give the solution, restart, or run the picture maker option.

Selecting any option apart from load and maker puts you straight into the game with the picture mixed up and one piece missing. Clicking on a block adjacent to the missing one slides that block very quickly into the space, allowing you eventually to put the picture back together. The moment you complete it the missing piece is also replaced.

The picture maker is the poorest part of the whole thing and it crashed the first time I used it – although this problem never recurred. It allows you to take any Mode 12 screen, or an ArmPaint picture, and convert it to the format required for the puzzle. It's then included in the load menu list.

Leapfrog isn't anything to do with Frogger, but is three versions of Solitare: Standard, where one of the pegs on the board must finish in the middle; Blue Peg, where a specific peg – the blue one – has to end up in the middle; and Surround, where four pegs have to finish one in each corner of the central nine hole block.

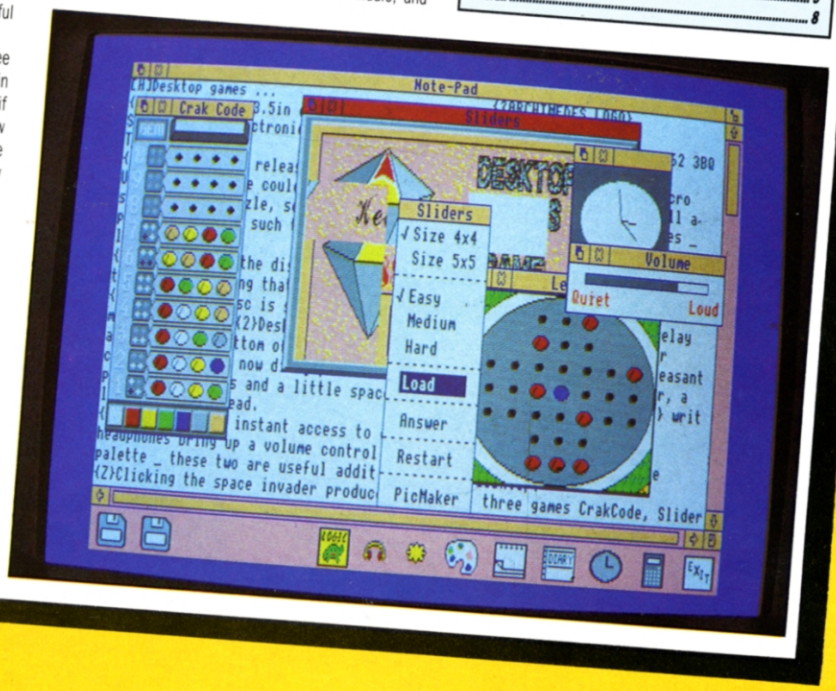
When a peg is clicked it turns yellow and you can move it to a legal position by clicking the appropriate hole – the one that has just been jumped will disappear.

While not spectacular the games are produced with a professional finish seldom seen on games two or three times the price. They are perfectly integrated with the rest of the Desktop – and this review was written in the notepad with the games on screen simultaneously.

But, despite my admiration of the programming, it takes time to load and is it worth the effort when the Desktop is supposed to provide fast entry to other programs?

Steve Turnbull

Sound	*5*
Graphics	*9*
Playability	*8*
Value for money	*9*
Overall	*8*



BARBARIAN ... could slay you

Price: £9.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

AFTER the blaze of publicity that preceded this game's release, with an expensive advertising campaign featuring two rather well-built and scantily clad models, I was really looking forward to a game full of excitement and action.

Sadly, I was disappointed. It seems that Superior Software is suffering from a shortage of new ideas. This game is almost identical to Yie-Ar Kung Fu, only this time the figure you control uses a sword instead of his hands to fight opponents.

In this one or two player game the scenario is a fight against the 10 evil minions of the sorcerer Drax – and finally the sorcerer himself – in order to free the beautiful Princess Mariana. At first the opposition is easy to despatch but as they get more proficient the task gets harder.

From boot up you can select your preferred keys for both players or you can play the game with a joystick. From there you are presented with the choice of combat practice or starting the game itself: The Fight to the Death.

The former gives you the choice of a demonstration which shows the 16 different fighting moves you can make, or you can practice against a passive opponent. This may seem pointless – it did to me – but it was while I was busy hacking away at some poor, helpless chap that I discovered that it's possible to decapitate an opponent, which in turn leads to the most entertaining sequence in the whole game:

This involves a goblin-type creature which normally comes on at the left-hand side of the display once a combatant is dead, crosses the screen and exits at the right-hand side dragging the body behind him. If there's been a decapitation, the goblin collects the body as usual but casually punts the head off screen.

While still in combat practice mode you can opt for either one or two player modes. In the first you are pitted against a warrior who you must defeat in order to have the privilege of fighting another, slightly more proficient, one.

This goes on until either you defeat 10 of them or, as is more likely, one of them beats you. A fight ends when one of the combatants has taken 12 hits or is decapitated. In the two-player mode you each control a warrior and fight against each other. The same victory conditions apply, but you also have the added pressure of having to complete the duel in 90 seconds.

Of all the modes these two seemed the most pointless to me. If you're going to practice fighting 10 opponents, you might as well practice while playing the actual game. That way if you do, by some miracle, manage to defeat all of them, you can get to enter Superior's own Barbarian competition.

The Fight to the Death is almost exactly the same as the combat practice mode. Again you can watch a demonstration, fight a passive opponent or a second player. The only difference is that if you opt for the Fight to the Death in one-player mode, you get to fight the evil sorcerer Drax after defeating the 10 Conan lookalikes.

Combat is punctuated by the sound of swords biting into flesh and the satisfying *thunk* as your warrior head-butts his opponent. These few sound effects can be turned off by pressing function key one. There is no signature tune, which some would say is a blessing, but I find Superior's tunes are better than most and it's unusual for them not to bother with one.

My biggest disappointment was with the graphics. I've no grumble with the quality – which is excellent – but I was disappointed with the quantity. There seem to be only four screens, and the two arena ones featured on the packaging are the only ones I've come across in Fight to the Death mode.

You begin fighting in front of someone sitting on a throne. In the second bout you face your opponent in front of Drax and the captive Mariana – who, by the way, bears no resemblance to the young lady featured on the packaging. Then it's back to the man on the throne again and so on.

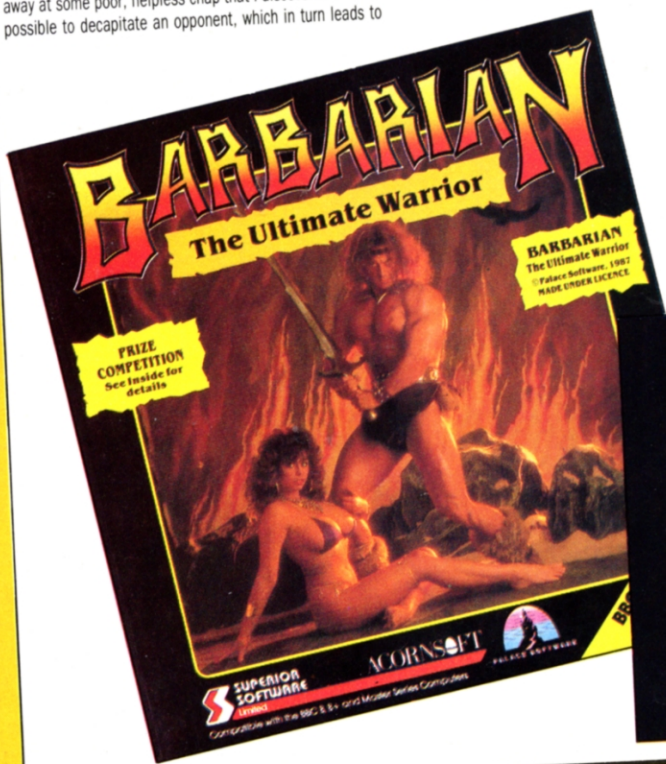
The other two screens only appear in the combat practice mode. Again they alternate, this time featuring two wilderness scenes, the first in daylight and the second at night.

Another point is that your adversaries are exact clones of your warrior except that yours is wearing a white vest. Even so, there have been a few times when I've smugly watched one of the warriors making mincemeat out of the other congratulating myself on some nifty swordwork, only to realise that it's the bad guy who was doing the hitting.

I don't want to give the wrong impression about this game: If you are a fan of games which simulate physical combat, martial arts and the like, you will find Barbarian an excellent addition to your collection. To it's credit, Barbarian has little for me to criticise, except for the fact that I've seen it all before.

Desmond

Sound	6
Graphics	8
Playability	7
Value for money	8
Overall	7



SOFTWARE SCENE

WAY OF THE EXPLODING FIST ... still packs a punch

Price: £1.99
Supplier: Mastertronic, 8-10 Paul Street, London EC2A 4JH.
Tel: 01-377 8411

THIS is a re-issue of a piece of software which was so well received when it first came out that it won a number of awards. It is a karate simulation game in which your aim is to work your way through the various skill levels until you reach the 10th Dan.

Unlike other similar programs, the setting is very definitely sporting. The rules of karate are adhered to in a fairly strict manner and no weapons are used at all – just the hands and feet.

As is usual with this type of simulation, the main problem is getting to grips with the mind-boggling number of actions. There are 16 different functions which can be controlled either from the keyboard or joystick. They give you a full range of punches, kicks, somersaults and other movements to be used against a micro-controlled opponent or another person.

The best way to practice moves is to select the two player option, without actually having a second player. Having coped with the keys required, you will be ready to tackle active opposition.

Your first opponent is remarkably unskilled in the art of karate. It should be no time at all before you have scored a victory over him. This will give you a chance to move on to the next competitor who is much more adept at dodging your moves and then felling you with a quick roundhouse kick.

With a lot of practice you will be able to beat a whole series of opponents, each a little more skilled than its predecessor.

The graphics are very good with fast, flicker-free movement and the sound is adequate with nothing too spectacular.

If you missed Way of the Exploding Fist first time round and haven't found it on a compilation this re-release is a snip.

Rog Frost

Graphics	**8**
Sound	**5**
Playability	**9**
Value for money	**9**
Overall	**8**

NOT A PENNY MORE, NOT A PENNY LESS ... no sale

Price: £14.95 (cassette) £19.95 (disc)
Supplier: Domark, 204 Worple Street, London SW20 8PN.
Tel: 01-947 5622

THE books of popular author Jeffrey Archer sell in their millions, and I enjoyed *Not a Penny More, Not a Penny Less* when I first read it some years ago: It is a light-hearted romp of the "Don't get mad, get even" genre, with an amusing twist in the tail.

Consequently, I was delighted when the adventure game was released. I booted the 40/80 track disc – to receive an error message. I managed to load the program by switching my disc drive to 40 track mode but, try as I might, I could not boot it in 80 track format. I have ordinary Cumana switchable drives and an Acorn DFS.

The loading screen showed a cleverly-drawn picture and there was a prompt asking which of the game's three parts I wished to play. I loaded part one and discovered I was to be cast as Stephen Bradley, the American academic working at Magdalen College, Oxford. My task was to recover the money I had lost by investing in an oil company floated by that rogue Harvey Metcalfe who was now laughing all the way to his Swiss bank at my expense, and that of three other luckless punters.

I confess I liked neither the constant use of upper case letters nor the sloppy screen layout of the descriptions. They looked amateurish, as if the conversion for the BBC Micro had been delegated to the tea boy, but I persevered.

Starting in my room at Magdalen, I began to enter instructions, and rapidly discovered the limitations of the parser. I began to suspect that the tea-boy's understudy must have had a hand in it, too.

Opening and examining various things I discovered a camera, three dossiers, Principia Mathematica, The Tatler and some phone numbers.

I dialled Scotland Yard and my stockbroker answered! He proceded to give me details of my fellow victims and I began to suspect the tea boy of even darker designs. Tea boys don't know that an essential input from an adventurer is Inventory – or Inv or even I – so that we can keep track of what we are supposed to be carrying. Naturally, the parser of Not a Penny More does not acknowledge the existence of such a combination of letters.

Similarly, tea boys don't expect the present-day player to abbreviate direction input: There was no response to commands like N or S, and only GO NORTH and the like produced results.

Opening a door and leaving my room proved impossible – was I to be trapped there forever? Never! Trust your old Hatter friend to try the daftest procedures known to mankind and deliver the goods:

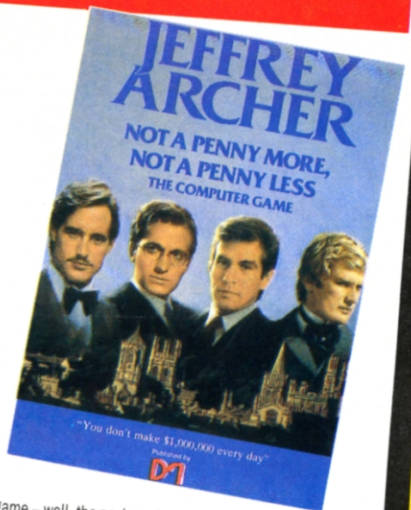
EXAMINE ROBIN produced a door-knocking policeman, full of suspicion.

EXAMINE JEAN-PIERRE instantly transported me to Bond Street, and I then found my way to Pall Mall and did some shopping.

EXAMINE JAMES teleported me to the Bodleian, an attractive librarian and various tomes.

At this point my waning interest finally evaporated. Usually I try to find at least some redeeming feature in an adventure game – well, the package includes the book which I enjoyed. As for the rest, there's a reversible disc with approximate value 50p – not a penny more, not a penny less.

Mad Hatter



Atmosphere	**0**
Complexity	**0**
Presentation	**1**
Value for Money	**0**
Overall	**0**

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ACORN

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B B+ Master

Glasgow Font's face lift

Conrad H. Gempf tries his hand at producing a natty line in letters

A FEW days ago, I totally redesigned Glasgow. Despite the sentimental memories I had of it, the time had come for a total reconstruction. The Glasgow in question is not the city, however. As a new micro user a year and a half ago, I bought a font designer and produced a typeface I called Glasgow in honour of the Glaswegian architect who inspired it, Charles Rennie Mackintosh.

It was my first project, and my inexperience showed. Using experience gathered from more than a year in the "font biz", I herewith offer some tips and observations, some of which helped considerably in the Glasgow face-lift.

The first step in designing a typeface is to know what you want the alphabet to look like. Clarify in your own mind the features that define the font. An outsider looking at your typeface should be able to see at a glance that all the characters in your font belong together somehow.

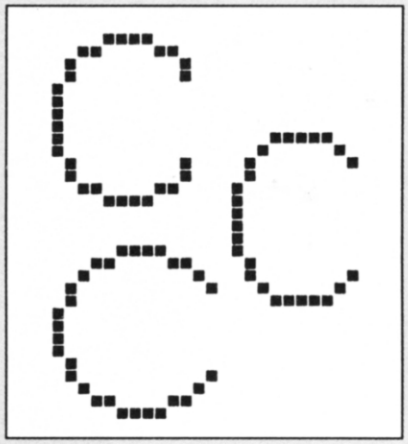
If you don't have a copy on paper of every letter in the font, sketch one out with pencil and paper. Fine though the BBC Micro is, pencil and paper are much better tools with which to begin the process. Savour the effortlessness of constructing curves and diagonal lines. You are about to enter the less flexible world of the pixel.

There are certain key letters that, in most fonts, force decisions that will affect many of the other characters. Start by working on the lowercase letters n and h of your font. When they look right, notice their width and their relative heights.

The width will normally turn out to be the average width for the rest of the letters, while the heights will be shared by most or all of the other characters.

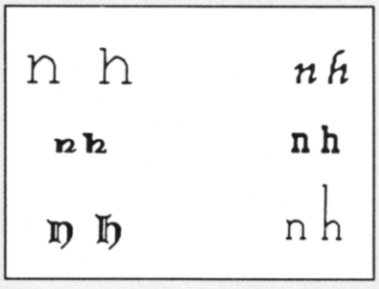
In addition, you will find that many characters are variations on this basic shape. The m is an n with more, as the r is an n with less. The l, t, f, i and j are all related to the straight part of the h in

Turn to Page 39 ▶

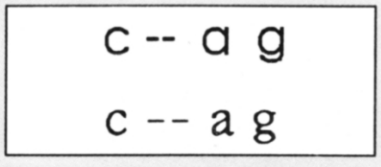


Producing curves is tricky. Here are three strategies that look good on paper.

Despite the fact that these fonts are very similar you should be able to match the first to the second for each pair.



Just knowing what the letters n and h will look like is the key to the font.



In some fonts a and g are based on c – but not in all.

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◀ *From Page 37*

one way or another.

The next character to receive attention should be the c. The same height as and comparable in width with the n, your c will demonstrate how you plan to handle most of the curved letters. The lowercase o and e come from the c, and so do all the variations with "sticks": The b, d, p, q and sometimes g and a.

The more elaborate versions of the a and the g will take some attention, as will the s in any alphabet.

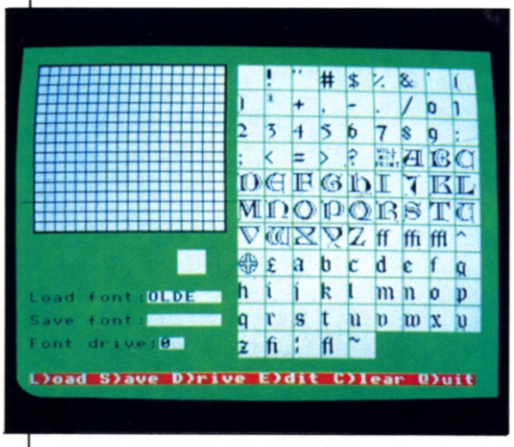
Occasionally the letter y fits in with the abdpq lot, but more usually it belongs to the most awkward group of letters which are primarily diagonal. Along with y, there are v, w, x, z and k. Expect trouble when working with these, as the pixel is not very well-suited for representing diagonals.

Capital letters may be similarly broken into three categories: The basically straight ones – IHLEFTJ, the round forms – OQCGDUBPRS, and the diagonals – AVWYMNKZ.

On the whole the caps are easier to make – at least partly because they are permitted so much more space. Our old friends W and S are usually the worst of the bunch.

When you have the main alphabet up and running, please take the time to put in the accented characters. Just copy the a and add the relevant accents. It will only take a few minutes, but it will greatly add to the usefulness and the professional quality of your font.

Finally comes the really difficult part – finding a city name that isn't already taken. Will Bourton-On-The-Water be accepted as a filename do you suppose?



Font designer screen from the font Style package.
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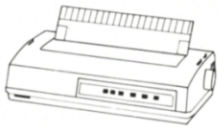

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Setting the scales

Peter Davidson continues his investigation into the features of Watford Electronics' Dump Out 3 rom

THIS month I want to investigate the commands that affect the size and position of the printout from Watford's Dump Out 3 rom. And I have a listing that lets you get the most out of the software easily. The size of dump is changed by adding two parameters to the *GIMAGE command – H and V followed by numbers – and they can be used either together or individually.

H changes the horizontal scale while V alters the vertical one and if you just use one of them, or you use them set to different values, the output will be elongated or squashed.

So H and V can be used to give, say, half-size dumps, or they can be used to adjust the proportions slightly if the default output looks distorted. Drawing a circle and dumping it is the best way to check the proportions – Listing I does just that.

But H and V are both followed by a number, so let's look at how to calculate that. First, decide by how much you want to scale your output – I'll show the calculations for half and double size, but the principles are the same for any size. Now divide 256 by the scale and convert the result to hexadecimal.

For a half-size printout you divide 256 by half – which is equivalent to multiplying it by two – and convert the result, 512, to hexadecimal – &200. So the command for a half-size dump is:

```
*GIMAGE EPS H&200 V&200
```

In a similar way, the parameters for a double-sized dump are calculated by dividing 256 by two and converting the answer to hexadecimal. The command is:

```
*GIMAGE EPS H&80 V&80
```

Let's move on to the position of the dump on the paper. The parameter I followed by a number determines the indent from the left-hand edge of the paper – useful if you want to centralise the output or print two small dumps side-by-side.

This time we're working in decimal, and the value is in tenths of an inch. So for a 1.5in indent the command is:

```
*GIMAGE EPS I15
```

Pictures can be printed on their side or even upside down. To rotate the output the parameter is R followed by a number representing the number of right angles it is rotated through. So R1 gives a dump on its side, R2 produces it upside down and R3 gives one on the other side.

If you are dumping Mode 7 screens there are two useful parameters you can use. To make characters stand out more clearly from the background – for example if you have red on blue – use the parameter E – for expand contrast. To make separated graphics print as contiguous use C. In some cases the filled-in areas produced look better on the paper.

A parameter that can sometimes make dumps look better is L. Using it a whole number of dots on the paper represents pixels on the screen. Only certain values of H and V can be used with this – see the manual for details. The proportions of the dump may be distorted on some printers if L is used, so the best way to see if it improves your image is to try it.

Last month we looked at dumping part-screens using *GWINDOW to select the area. If you want to dump a fixed part of a screen – say from within a program to miss off icons down the side of a display – the parameters following the *GIMAGE command are X and Y together with the screen co-ordinates. The coordinates to be used can be found using *GWINDOW and pressing P as described last month.

The numbers are output in the order you need

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'Pictures can be printed on their side or even upside down'

```
Watford Electronics Dumpout Encoder
By Pete Davidson  (c)The Micro User

    Feature                    Code      Effect

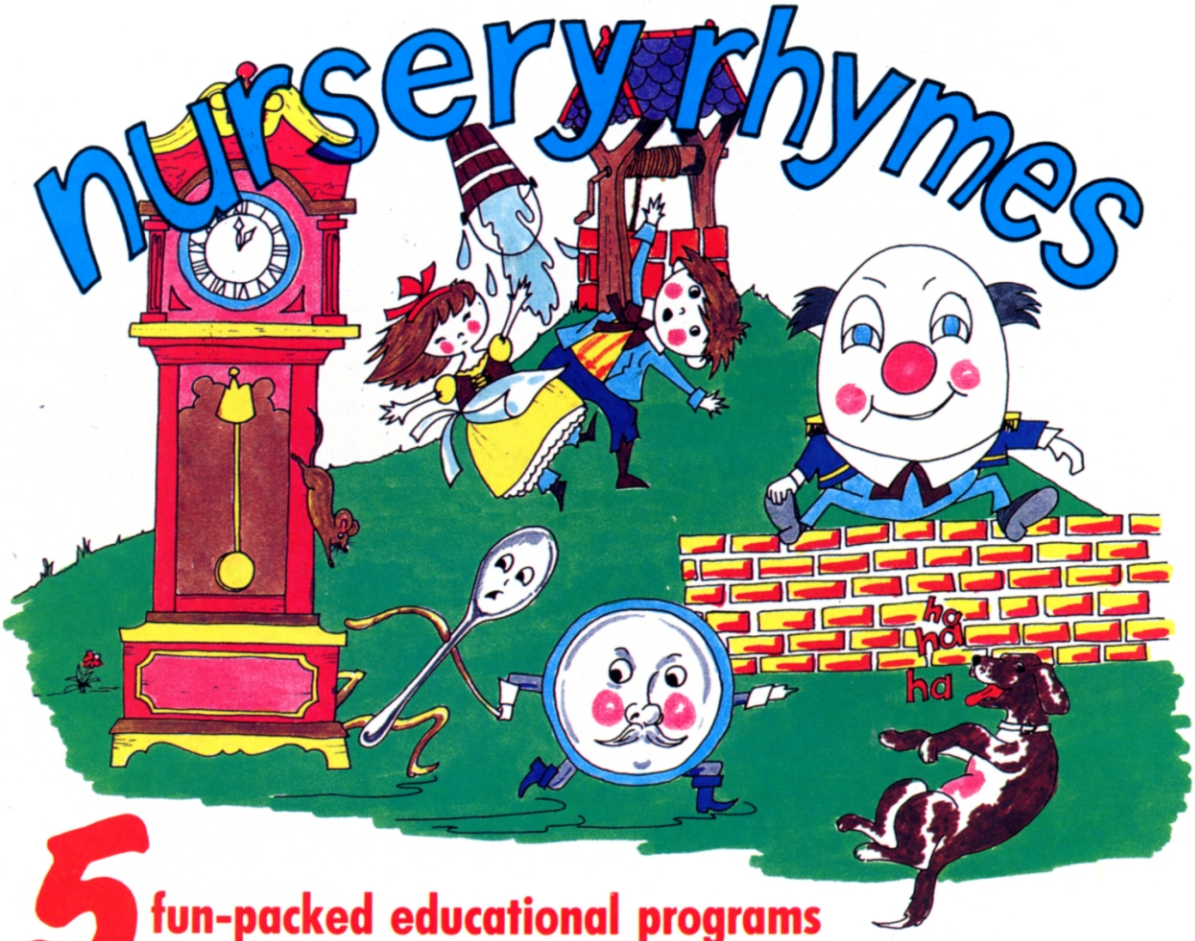
Contiguous (Mode 7)
Expand contrast (Mode 7)
Linear step size
Fast                           F
Grey scale
Horizontal scale               H&200     50%
Vertical scale                 V&1EC     52%
Indent                         I25       2.5in
Physical colours
Rotation                       R1        90'
Two tone
Key triggered                  K
Switch triggered
DUMP SCREEN
QUIT

The command is:
*GIMAGE EPS F H&200 V&1EC I25 R1 K
```

Entering the parameters into the Encoder

THE MICRO USER MAIL ORDER OFFERS

nursery rhymes



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◀ *From Page 41*

for a VDU command – xmin,ymin,xmax,ymax. It's a simple matter to put them in X<min><max> Y<min><max> form the Dump Out rom needs, so the command to print a top right-hand portion of the screen would be:

```
*GIMAGE EPS X508,1279 Y492,1023
```

The final command is M for Mask. To use this one you need a knowledge of technical things beyond the scope of this article – as it would take a full feature to explain the concepts of masking in simple terms.

So, let's move on to Listing II, a program to evaluate the Dump Out command for you and, if you wish, print a screen or define a function key ready for future use. Type in the listing, check it using Get it Right! and save it.

When you run it you are prompted for the code for your printer. If you're not sure, enter ? and, providing you have a Dump Out rom installed, you will be presented with a full list of the options. If you always use the same type of printer, say Epson, you can change line 140 to:

```
140 printer$="EPS "
```

to save having to enter EPS every time. Note that there is a space after EPS.

The next prompt you'll get is for the function key that will be defined as you exit from the program. You can then press the key to implement the command – especially useful for a key-triggered dump – or use it to insert the appropriate command into one of your own routines.

If you always want key 0 defining you can change line 150 so that *fkey$* is defined rather than input:

```
150 fkey$="0"
```

To prevent any key being defined set *fkey$* to the null string.

You are next presented with a menu of the options you can evaluate from the program. Features are selected by highlighting the one you want to change using the up and down arrow keys. You can also move straight to one by pressing its first letter, so to move to the fast option, press down-arrow six times or just hit F.

Options can be toggled on or off by pressing Return. The ones switched on are indicated by the appropriate code being printed alongside the feature and are also included as part of the command displayed at the bottom of the screen.

Rotations are selected by repeatedly pressing Return while the feature is selected: You will cycle between nothing, R0,R1 and R2. The angle of rotation will be displayed on the right of the screen.

Indent, vertical and horizontal scales are selected by moving the highlight to the appropriate one and using the left and right cursor keys to change the values. Confirm your choice with Return. You can cycle through the values 10 at a time by holding Shift down as you press the arrow keys or you can step 100 at a time by using Control.

The effect is displayed on the right of the screen, and in the case of indent this is the distance in inches that the output will be moved over. The effect for vertical and horizontal scales is shown as a percentage so, for a half size dump you select 50 per cent while for a double size one select 200 per cent.

The final two options are Dump screen and Quit. The latter leaves the program, and if you requested it at the start, defines a function key for future use. The Dump option prints a screen previously saved to disc or tape using the parameters you've set up.

You'll be asked for the filename of the saved screen and then the mode that it is in. The screen will then be dumped, but remember, that no account is taken of palette changes. Once the printing has finished you'll be asked if you want to dump another screen. You can keep outputting screens until you answer N when you'll exit the program – defining a function as if Quit had been chosen.

So there you have it. If you've got Dump Out 3 you can now make more use of its many features. Remember, to get the best dump you must experiment with the various parameters on your own printer.

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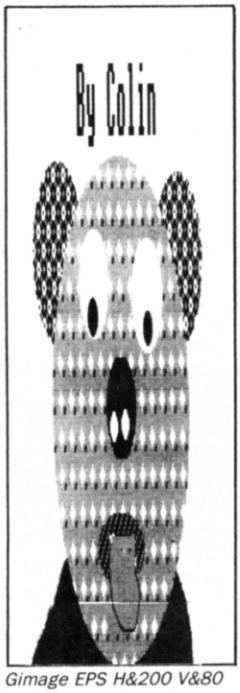
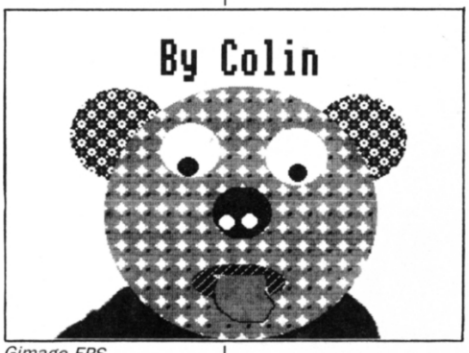


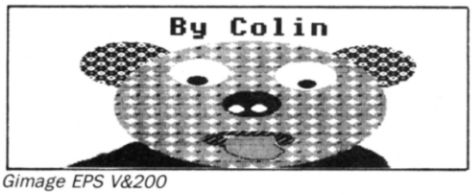
Gimage EPS H&200 V&80



Gimage EPS

Gimage EPS H&200

These dumps illustrate the power of the H and V parameters. Usually they are set to the same value – or a similar one to compensate for differences between various printers – but here we've used the wider ranging ones shown.



Gimage EPS V&200

FEATURE

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```
  10 MODE 4
  20 OX%=500:OY%=500:R%=200
  30 X%=0:Y%=R%:E%=3-2*Y%
  40 REPEAT PROCnext:UNTIL X%>Y%
  50 *GIMAGE EPS F
  60 END
  70 DEFPROCnext
  80 PROCplot(X%,Y%):PROCplot(-X%,Y%)
  90 PROCplot(X%,-Y%):PROCplot(-X%,-Y%)
 100 IF E%<0 E%=E%+4*X%+6 ELSE E%=E%+4*
(X%-Y%)+10:Y%=Y%-4
 110 X%=X%+4:ENDPROC
 120 DEF PROCplot(X%,Y%)
 130 PLOT 69,X%+OX%,Y%+OY%
 140 PLOT 69,Y%+OX%,X%+OY%
 150 ENDPROC
```

Listing I: A circle dumping program

Get it right!

```
 10 = 20F1 1
 20 = 7650 7
 30 = 2D38 2
 40 = 982D A
 50 = C7C3 2
 60 = FD2E F
 70 = A5D2 8
 80 = 3F5A 3
 90 = 2800 A
100 = 2EF4 3
110 = C4D9 B
120 = 45F4 C
130 = C190 7
140 = C153 4
150 = ED0F B
```

A dump using the L option

```
  10 REM Dump Out 3 Encoder
  20 REM By Peter Davidson
  30 REM (c)The Micro User
  40 MODE0:VDU22,7
  50 PROCtitle
  60 PROCinit
  70 PROCscreen
  80 PROCselect
  90 IFfkey$<>CHR$13 PROCoscli("KEY"+fk
ey$+" *GIMAGE "+printer$+pars$+CHR$124+"
M")
 100 MODE7
 110 END
 120 DEFPROCinit
 130 *FX4,1
 140 PRINT"What is the code for your p
rinter?":INPUT"Enter ? to list all possi
bilities "printer$:printer$=LEFT$(printe
r$,3)+" ":IFprinter$="? " PROCoscli("HEL
P PRINTERS"):GOTO140 ELSE IFLEN(printer$
)<>4 GOTO140
 150 PRINT"Define which key (0-9)? Ret
urn=none. ";:fkey$=GET$:IFfkey$<>CHR$(13
) AND (fkey$<"0" OR fkey$>"9") GOTO150
 160 VDU23;8202;0;0;0;
 170 noo=15:opt=1:old=opt:dir=0:sp$=STR
ING$(10," ")
 180 DIMoption$(noo),state$(noo),val(no
o)
 190 val(6)=100:val(7)=100
 200 FORop=1TOnoo:READoption$(op):state
$(op)="":NEXT
 210 ENDPROC
 220 DEFPROCscreen
 230 CLS:PRINT"CHR$133TAB(5)"Feature"TA
B(25)"Code"TAB(33)"Effect":VDU28,0,24,39
,5
 240 FORop=1TOnoo:PRINTTAB(1,op)option$
(op),state$(op):NEXT
 250 ENDPROC
 260 DEFPROCselect
 270 REPEAT
 280 REPEAT
 290 PRINTTAB(0,old)CHR$135;TAB(0,opt)C
HR$130option$(opt)TAB(26,opt);:IFstate$(
opt)<>""PRINTstate$(opt)ELSEPRINTSPC(14)
 300  pars$="":FORn=1TOnoo:pars$=pars$+
state$(n):NEXT
 310 VDU28,0,24,39,22:CLS
 320 PRINT CHR$129"The command is: ":PR
INTCHR$129"*GIMAGE "printer$ pars$;
 330 VDU28,0,24,39,5
 340 key=GET:old=opt
 350 IFkey=138 AND opt<noo opt=opt+1
 360 IFkey=139 AND opt>1 opt=opt-1
 370 FORsel=1TOnoo:IF(key AND223)=ASC(o
ption$(sel)) opt=sel:NEXT ELSE NEXT
 380 UNTILkey=13 OR key=136 OR key=137
 390 IFstate$(opt)<>"" state$(opt)="" E
LSE state$(opt)=LEFT$(option$(opt),1)+"
"
 400 IF(opt=6 OR opt=7 OR opt=8)ANDstat
e$(opt)<>"" PROCscale
 410 IFopt=10 PROCrotate
 420 IFopt=14PROCdump
 430 UNTIL opt=15
 440 ENDPROC
 450 DEFPROCrotate
 460 dir=(dir+1)MOD4:val(opt)=90*dir
 470 state$(opt)="R"+STR$(dir)+" ":PRIN
TTAB(35,opt)LEFT$($TR$(val(opt))+""+sp$
,4)
 480 IFstate$(opt)="R0 " state$(opt)=""
 490 ENDPROC
 500 DEFPROCscale
 510 REPEAT
 520 IFINKEY(-1)sc=10 ELSE IFINKEY(-2)s
c=100 ELSE sc=1
 530 IFopt=6 OR opt=7 bit=9 ELSE bit=0
 540 IFkey=136 AND val(opt)>sc+bit val(
opt)=val(opt)-1*sc
 550 IFkey=137 val(opt)=val(opt)+1*sc
 560 IFopt=60Ropt=7 PROCsize ELSE PROCl
in
 570 key=INKEY(10)
 580 UNTILkey=13
 590 ENDPROC
 600 DEFPROCsize
 610 scale=256*100/val(opt):state$(opt)
=LEFT$(option$(opt),1)+"&"+$TR$~(scale)+
" "
 620 PRINTTAB(26,opt)LEFT$(state$(opt)+
sp$,8)TAB(35,opt)LEFT$($TR$(val(opt))+"%
"+sp$,5)
 630 ENDPROC
 640 DEFPROClin
 650 state$(opt)=LEFT$(option$(opt),1)+
STR$(val(opt))+" "
 660 PRINTTAB(26,opt)LEFT$(state$(opt)+
sp$,8)TAB(35,opt);:@%=&FF020109:PRINTLEF
T$(STR$(val(opt)/10)+"in"+sp$,5):@%=10
 670 ENDPROC
 680 DEFPROCtitle
 690 FORI%=1TO2:PRINTCHR$131CHR$141"Wat
ford Electronics Dumpout Encoder":NEXT
 700 PRINTCHR$134" By Pete Davidson  (c
)The Micro User"
 710 VDU28,0,24,39,3
 720 ENDPROC
 730 DEFPROCoscli($&700):LOCALX%,Y%
 740 Y%=7:CALL&FFF7:ENDPROC
 750 DEFPROCdump
 760 REPEAT:CLS
 770 INPUT"What is the name of the fil
e? "file$
 780 IFLEFT$(file$,1)="*" PROCoscli(fil
e$):GOTO770
 790 INPUT"What mode is it? "mode:IFmod
e<0 OR mode>7GOTO790
 800 VDU22,mode:PROCoscli("LOAD "+file$
)
 810 PROCoscli("GIMAGE "+printer$+pars$
)
 820 CLS:PRINT"Do you want to dump anot
her? ";:ans$=GET$:IFans$="n" OR ans$="N"
 opt=15
 830 UNTIL opt=15
 840 ENDPROC
 850 DATAContiguous (Mode 7),Expand con
trast (Mode 7),Linear step size,Fast,Gre
y scale,Horizontal scale,Vertical scale,
Indent,Physical colours,Rotation,Two ton
e,Key triggered,Switch triggered,DUMP SC
REEN,QUIT
```

Listing II: Automatic encoder for Dump Out 3

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 671B B
 50 = 5255 9
 60 = DEBB 4
 70 = 9538 E
 80 = F89D 5
 90 = 2C7A E
100 = 8AFC 6
110 = FD2E D
120 = 344C B
130 = E383 D
140 = 8EE1 E
150 = BF28 1
160 = F716 3
170 = 733A B
180 = 8E7D 2
190 = EB64 D
200 = F25D 0
210 = ED0F 3
220 = F5B9 8
230 =  29B 9
240 =   F3 E
250 = ED0F 4
260 = 981C A
270 = BFBA E
280 = BFBA 0
290 = 50D9 A
300 = C6DE 9
310 = 584E B
320 =  F85 F
330 = 1B97 5
340 = 3B7C 5
350 = E51B E
360 = A9A7 D
370 = 6274 3
380 = 47FF 3
390 = 1272 E
400 = 3474 D
410 = E65D 3
420 = 9CB5 F
430 = ADA0 0
440 = ED0F A
450 = 4142 2
460 = 4E36 6
470 = B9E5 D
480 = DBB9 C
490 = ED0F 5
500 = 5EDD 9
510 = BFBA F
520 = 6DD8 9
530 = 8781 0
540 = 6EDE E
550 = 43EF 7
560 = CC38 3
570 = E0DD 9
580 = 65C1 2
590 = ED0F 9
600 = 96E0 1
610 = F167 7
620 = FE11 8
630 = ED0F 9
640 = B66D 7
650 = C2E6 5
660 = 2D4F 4
670 = ED0F 6
680 = F931 0
690 = 6A53 6
700 = 1BE2 E
710 = 7B51 4
720 = ED0F 2
730 = A6F3 8
740 = 50E0 E
750 = 3218 F
760 = 98EA 0
770 = 9395 B
780 = 7631 8
790 = 9255 0
800 = 5335 E
810 = B314 C
820 = 5F4B 9
830 = ADA0 7
840 = ED0F D
850 =  4E4 E
```

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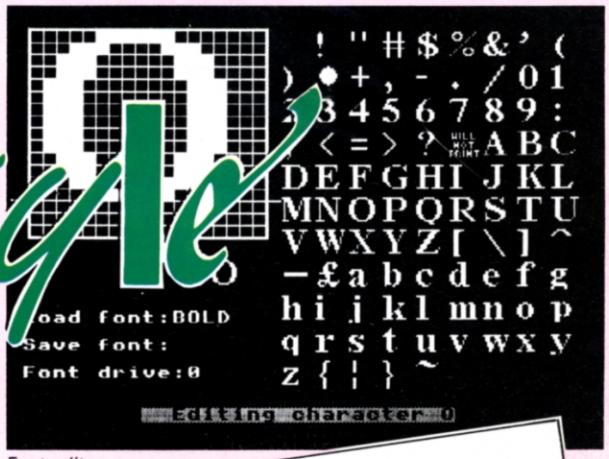
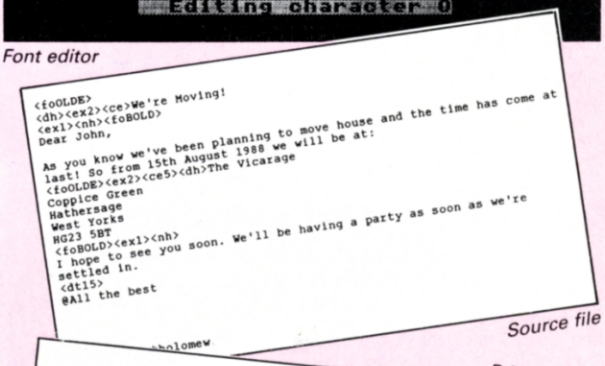
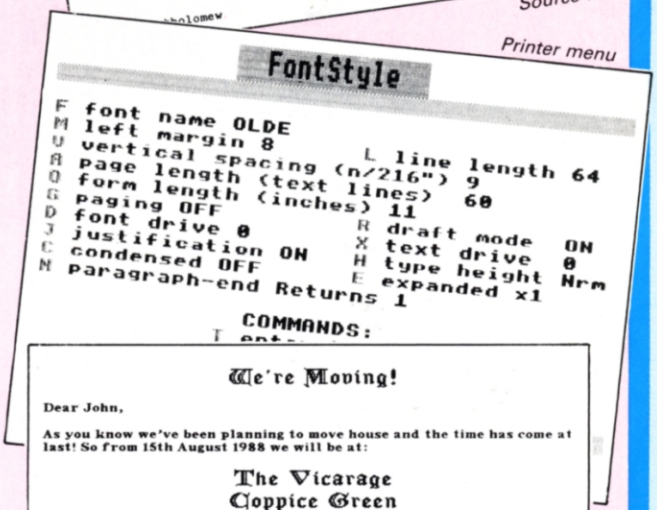


Font editor



Source file



Printer menu

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All the best

Graham Bartholomew

Example output

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Archimedes SOFTWARE

Stop Debugger upsetting things

Neil Strong cures his printer problems with a software module

DEBUGGING machine code on the Archimedes is fraught with difficulties, not the least of which is your printer going haywire when the Debugger module sends it unfiltered control codes. This problem can, however, be solved by writing a module that stays resident while you work, filtering characters as they go to the printer. If it finds control codes it converts them into something printable.

Software modules on the Archimedes are equivalent to sideways roms on the BBC Micro, but as they are ram resident they have to be loaded up each time you switch on.

Also, on the BBC Micro each rom has to perform its own command line decoding to check whether a particular star command is addressed to it. However the Archimedes operating system – Arthur – does this job itself, scanning each module in turn. So all you need to do is provide the commands and routines within your module, Arthur does the rest.

What we want to do is intercept the route that characters take on their way to the printer, check if they are printable and if not replace them with a full stop. The best place for this is the *Insert into buffer* vector, which Arthur allows us to legally intercept by using a software interrupt – SWI

By calling the claim vector SWI with the number of the vector we want and the address of our routine, we arrange for Arthur to jump to our code when the vector is used. Then our routine makes sure that the printer buffer is being used, examines the output character and if it's not printable converts it to a full stop.

With three commands to turn the filter on, off and print the current setting, we're all set to design the module itself.

The listing is thoroughly annotated, so you should be able to work out what's going on. Remember that the ARM chip has 16 (0-15) registers to play with. Of these r15 is the program counter, r14 the link register containing the return address for a subroutine jump, and r13 is usually used as the stack pointer.

When Arthur enters a user routine r12 always contains a memory workspace pointer.

Lines 110 to 210 are the key to the module. Each four byte word holds addresses of routines or tables within the module. Each address is actually just a position within the module relative to its start. For example, the value of *title_string* is 44 – &2C – because it is located that number of bytes from the start.

All addresses are arranged in this way because all modules have to be relocatable. Unlike the BBC Micro, where we know that a sideways rom will always start at address &8000, the Archimedes equivalent could be loaded at &181500C or &1816784 – in fact anywhere in the relocatable module area, RMA. So we must never make any reference to absolute addresses; when working with the ARM everything is relative.

Lines 320 to 350 carry out the vector claim with the following register set-up:

r0	Vector to claim
r1	Address of our routine
r2	Address of routine workspace

Sometimes Arthur moves things around in the RMA. To prevent the software becoming confused we need the *finalise_code* to allow the operating system to switch the module off before the move – it gets switched on again afterwards.

Moving on to the actual processing routine, the instruction at line 670 ensures that we are dealing with the printer buffer. Then the character – in r0 – has its top bit cleared, making its value less than 128, and any control codes are converted to a full stop.

Everything else should be quite clear from the listing. Pete Cockerell's book ARM Assembly Language Programming – reviewed in the September 1987 issue of *The Micro User* – explains the more obscure machine code instructions.

Well, that's it. Type it into your Archimedes and try it out. And if you're feeling adventurous why not try out some extensions – like converting all output to hexadecimal.

Turn to Page 49 ▶

Archimedes

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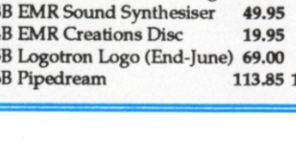

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◀ *From Page 47*

```
10 REM > StripCtrl
20 REM by Neil Strong
30 REM (c) The Micro User
40 PROCinit:PROCassem:PROCsave:END
50 DEF PROCinit:DIM code% 1000
60 pc=15:link  =14:sp=13:datap =12
70 InsertVector=&14:PrintBuffer =3
80 RMA_Claim   =6:ENDPROC
90 DEF PROCassem
100 FOR L%=4 TO 6 STEP 2:P%=0:O%=code%:[OPTL%
110  EQUD 0               ; no start code
120  EQUD initialise_code ; initialisation code offset
130  EQUD finalise_code   ; termination code offset
140  EQUD 0               ; no service calls
150  EQUD title_string    ; offset of module title
160  EQUD help_string     ; offset of help string text
170  EQUD command_table   ; command blocks offset
180  EQUD 0               ; no SWI chunk base
190  EQUD 0               ; no SWI handler
200  EQUD 0               ; no SWI decoding table
210  EQUD 0               ; no SWI decoding code
220 .title_string
230  EQUS "PrintStrip":EQUB 0:ALIGN
240 .help_string
250  EQUS "Printer Utility":EQUB 9:EQUS"1.00 (27 Jan 88")
260  EQUB 0:ALIGN
270 .initialise_code
280  stmfd      (sp)!,{link}
290  ldr        r0,[r12]      ; get workspace pointer
300  cmp        r0,#0         ; if it <> 0 then
310  ldmnefd    (sp)!,{pc}    ; continue else return
320  mov        r2,r12        ; workspace
330  mov        r0,#InsertVector
340  adr        r1,excode     ; code to redirect through
350  swi        "OS_Claim"    ; Claim Vector
360  mov        r3,#16
370  mov        r0,#RMA_Claim ; claim 16 bytes workspace
380  swi        "OS_Module"
390  ldmvsfd    (sp)!,{pc}    ; return if request failed
400  str        r2,[r12]      ; else store workspace area
410  mov        r0,#0
420  str        r0,[r2]       ; set strip ON
430  LDMFD      (sp)!,{pc}    ; and exit
440 ;-----------------------------------------------
450 ; Finalise
460 ; This code is called when the module is killed or
470 ; the RMA area tidied.  It releases the vectors
480 ; claimed earlier - otherwise the machine is subject
490 ; to rapid demise when char's are sent to the printer
500 ;-----------------------------------------------
510 .finalise_code
520  stmfd      (sp)!,{link}
530  mov        r2,r12           ; point to my workspace
540  mov        r0,#InsertVector ; vector to release
550  adr        r1,excode        ; code to release
560  swi        "OS_Release"     ; release vector again
570  ldmfd      (sp)!,{pc}
580 ;-----------------------------------------------
590 ; Examine Character
600 ; This is the code through which the printer buffer
610 ; insert vector passes.  If the strip is enabled, all
620 ; characters are checked to ensure that they are
630 ; printable.  If not, it's converted to a '.'
640 ;-----------------------------------------------
650 .excode
660  stmfd      (sp)!,{r1-r4,link}
670  cmp        r1,#PrintBuffer  ; check dest buffer
680  ldmnefd    (sp)!,{r1-r4,pc} ; return if not printer
690  ldr        r12,[r12]        ; get workspace pointer
700  ldr        r3,[r12]
710  cmp        r3,#0
720  ldmnefd    (sp)!,{r1-r4,pc} ; return if no strip
730  and        r0,r0,#&7F       ; strip top bit
740  cmp        r0,#13
750  beq        ok               ; don't touch returns
760  cmp        R0,#10
770  beq        ok               ; or line feeds
780  cmp        r0,#32
790  movlt      r0,#ASC"."       ; convert if < space
800  cmp        r0,#&7F
810  moveq      r0,#ASC"."       ; or a Delete
820 .ok
830  ldmfd      (sp)!,{r1-r4,pc}
840 ;-----------------------------------------------
850 ; Command blocks to define extra commands
860 ;-----------------------------------------------
870 .command_table
880  EQUS "Pstatus":EQUB 0:ALIGN
890  EQUD Pstatus_code
900  EQUD 0:EQUD 0
910  EQUD Pstatus_help
920 ;
930  EQUS "StripOn":EQUB 0:ALIGN
940  EQUD StripOn_code
950  EQUD 0:EQUD 0
960  EQUD StripOn_help
970 ;
980  EQUS "StripOff":EQUB 0:ALIGN
990  EQUD StripOff_code:EQUD 0:EQUD 0:EQUD StripOff_help
1000 ;
1010  EQUB 0
1020 ;-----------------------------------------------
1030 ; Help text - printed when you *HELP <command>
1040 ;-----------------------------------------------
1050 .Pstatus_help
1060  EQUS "Shows whether the Strip function is enabled."
1070  EQUB 0
1080 .StripOn_help
1090  EQUS "Allows only ASCII characters to the printer."
1100  EQUB 0
1110 .StripOff_help
1120  EQUS "Allows all characters to printer unchanged."
1130  EQUB 0
1140  ALIGN
1150 ;-----------------------------------------------
1160 ; *PSTATUS code
1170 ; Displays whether the control code filter is in on.
1180 ;-----------------------------------------------
1190 .Pstatus_code
1200  stmfd      (sp)!,{link}
1210  ldr        r12,[r12]   ; get pointer to workspace
1220  ldr        r0,[r12]    ; get filter flag
1230  cmp        r0,#0       ; true?
1240  adreq      r0,on       ; point to filter on message
1250  adrne      r0,off      ; else filter off
1260  swi        "XOS_WriteS"
1270  equs       "Control Character Filtering is "
1280  equb       0:ALIGN
1290  swi        "XOS_Write0"  ; write on/off
1300  swi        "XOS_NewLine" ; next line
1310  ldmfd      (sp)!,{pc}    ; return to caller
1320 .on
1330  equs       "ON":equb 0
1340 .off
1350  equs       "OFF":equb 0
1360  ALIGN
1370 ;-----------------------------------------------
1380 ; *STRIPOFF code - switches off the filter
1390 ;-----------------------------------------------
1400 .StripOff_code
1410  ldr        r12,[r12] ; point to work area
1420  mov        r0,#1     ; switch filtering flag off
1430  str        r0,[r12]
1440  mov        pc,link
1450 ;-----------------------------------------------
1460 ; *STRIPON code - switches on the filter
1470 ;-----------------------------------------------
1480 .StripOn_code
1490  ldr        r12,[r12] ; point to work area
1500  mov        r0,#0     ; switch filtering flag on
1510  str        r0,[r12]
1520  mov        pc,link
1530 ALIGN:]:NEXT:ENDPROC
1540 DEF PROCsave
1550 OSCLI "SAVE Pstrip "+STR$~code%+" "+STR$~O%
1560 OSCLI "SETTYPE Pstrip FFA":ENDPROC
```

INTEGRA-B

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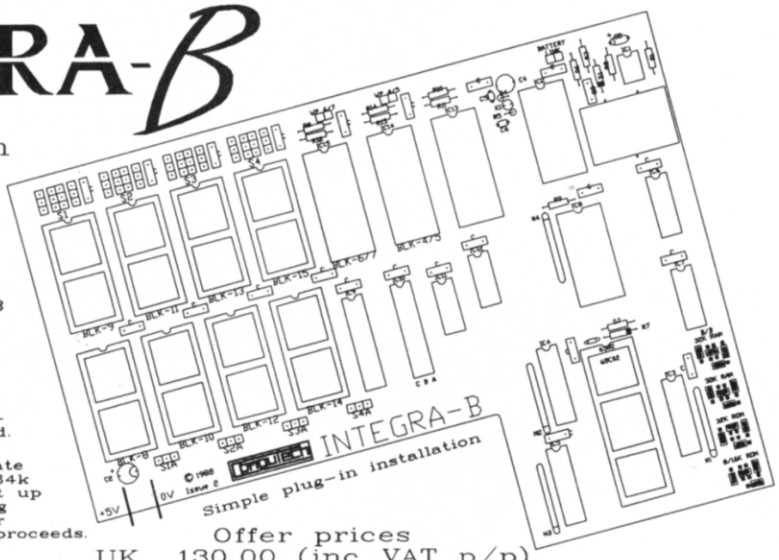

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B B+ M

Screens by Design

Ian Waugh checks out a professional Mode 7 screen maker

HAVE you ever marvelled at the Mode 7 screens you've seen on Ceefax, Oracle and 4-TEL? Even information pages with their titles standing out in relief are very impressive – not to mention the graphic screens.

And if you've tried to produce anything but the simplest Mode 7 screen you'll know how difficult it can be, especially from Basic.

Typing in control codes and looking up the characters to produce a specific pixel arrangement is hardly conducive to creative programming. You need a Mode 7 screen editor – such as Design 7 Plus.

The program boots from disc and offers two choices: The Editor and a Basic Converter. In the former a status line at the bottom of the screen tells you the cursor's position and the character covered by it, plus its Ascii code. The teletext control codes are translated so, for example, 148 is shown as G.BLUE – Graphics Blue.

The control codes are accessed by pressing Shift or Control with a function key. You'd expect this from any Mode 7 editor but it's the extra features and automatic functions which make the program so interesting. So let's see what goodies are available.

You can change the colour of the screen from the cursor position across to the right and down to the bottom of the screen or a frame centred on the middle of the screen, even define a pixel-wide rectangle up to 37 by 22 characters in size.

Text can be entered normally, automatically in double height or selected from one of three big special fonts. The largest produces characters eight lines high by eight characters across and that's big. You can space text – and graphics – by inserting and deleting lines or characters and there's a line copy facility.

You can change a single character or code to any other code across the whole of the screen. This lets you easily change a colour, for example.

There are several aids to help you design graphic screens: In Sketch mode you can draw graphics using the cursor keys. Pixel mode allows you to use QW/AS/ZX to toggle the six graphics pixels in a character on and off, and pressing I in this mode inverts the pattern. Having defined a pixel pattern, the Paint option lets you put it anywhere on screen.

Particularly useful are the Cut and Paste options which allow you to define a section of the screen – a window – and save it to disc. It can then be pasted on to any position on the screen so you can use a special design on many different pages.

A section of the screen can be marked and five operations performed: It can be copied, erased or recoded to change a specific character. All the graphics shapes can be inverted, while Mirror flips the whole marked area over – left to right – producing some fascinating results.

There's a word-wrap facility similar to that used by word processors. It saves you having to work out the length of your lines and words when entering a lot of text.

Using a Morley Teletext Adapter – see the special offer on Page 68 – you can drop a broadcast page on to the screen. And there's an Epson-compatible printer dump to give you hardcopy output.

The Basic Converter program, available from the main menu or as a direct command from the editor, turns the screen into a set of Basic statements which can be *EXECed into a program.

Finally, you have access to star commands – what program would be complete without that?

Design 7 Plus is a well thought out, carefully designed piece of software. It's extremely easy to use once you've mastered the keys. Text and information screens are an absolute doddle to produce – it can be almost as quick as entering text into a word processor.

If you have even a little artistic ability the special drawing routines will help you make the most of Mode 7. It doesn't have routines such as circle drawing or rubber banding standard in drawing packages using higher resolution graphic modes. Though possible in Mode 7, they are not very easy to implement.

Nor does Design 7 Plus allow you to create carousels or customise the display of a series of pages but then it wasn't intended to. If you want these features then check out Ted, Desfax, Masterfax and Vu-Fax which let you do this – and more.

Design 7 Plus is a super program and I have no hesitation in recommending it to anyone requiring a good Mode 7 screen editor. And look at the price – value for money indeed.

Product: Design 7 Plus
Price: £9.95
Supplier: Morley Electronics, Unit 3 Maurice Road Industrial Estate, Wallsend, Tyne and Wear NE28 6BY.
Tel: 091-262 7507

Similar packages reviewed in *The Micro User* are:
Ted: *December 1987*
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Terramex, from Bugbyte, is a classic conversion from the Atari ST and Amiga.
Missile Control is about as close to the original arcade version you can get.
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Music for pleasure

Ian Waugh begins a hands-on series exploring programming in Ample

AMPLE is an acronym for Advanced Music Production Language and Environment. It can be used for a variety of programming applications but it was specifically designed for music production and this is what we will be concentrating on in this three-part series. Unlike virtually any other computer language you don't have to learn great chunks of Ample before you can do anything useful with it. This is, in part, owing to very user-friendly front-end editors, themselves written in Ample and each a self-contained application program.

Ample was designed to support the various parts of the Hybrid Music System, in particular the Music 5000, a stereo digital synthesiser which can generate up to eight different voices – the BBC Micro's internal sound chip is not used at all.

The software-based editors and modules to drive the hardware are loaded from disc when required. Ample Nucleus is the rom-based core of the language and it manages the whole environment quite cleverly so the loading of modules is virtually transparent.

An important feature of Ample is the total integration of all the modules allowing data to be passed freely between them. The more I use Ample, the more aware I become of just how flexible, versatile and fascinating a system of music creation it is.

The user guide supplied with the system is excellent but in case you're not one for reading manuals or you don't have a Hybrid Music System, this series will work through the construction of a piece of music using the three main editors. Suggestions will be given for altering and modifying the music and, at the end of part three, you will have a customised and individual performance – even if you can't read music.

Ample has two modes – Command and Edit – and Tab is used to toggle between them. In Command mode a % prompt appears and indicates the system is waiting for user input. The format of Edit mode varies but you always use the Tab key to return to Command mode.

One of the most important features of Ample is concurrency – the ability to do more than one thing at the same time. It handles the playing of several music parts in parallel and, most importantly, lets you control the music from the keyboard simultaneously.

In Basic, for example, when you type RUN the program shuts you out until it's finished its task. In Ample, RUN starts the program then returns to Command mode. It will continue to accept other instructions while program execution proceeds.

When the system is booted you are presented with a menu of 10 options – Figure I. The cursor keys are used to highlight and Return is used to select. Pressing f0 in Command mode will always bring you back here ready to select another option.

Select the Staff Editor. Here music can be entered using traditional notation. If you can't read music, don't worry – all you need do is to copy the score shown in Figures IIa and IIb.

Press Tab to enter Edit mode and you will see a block cursor above the stave on the right square bracket. The brackets mark the start and end of the music and at the moment there is nothing there.

Press *c* to enter a Clef, press the minus sign to enter a flat for the key signature then press *k* to place it correctly on the staves.

Press *q* to enter a 4/4 time signature: Both values can be altered by using Shift and the cursor keys – see what range of time signatures it will accept then set it back to 4/4. If the block changes to a straight line you've pressed the up cursor without Shift. Press the down cursor to get the block back. Now we'll enter some notes.

Press Return and a note will appear on the stave and the block will step on ready for another note. Press the left cursor key to site the block over the note and use Shift and the cursor keys to

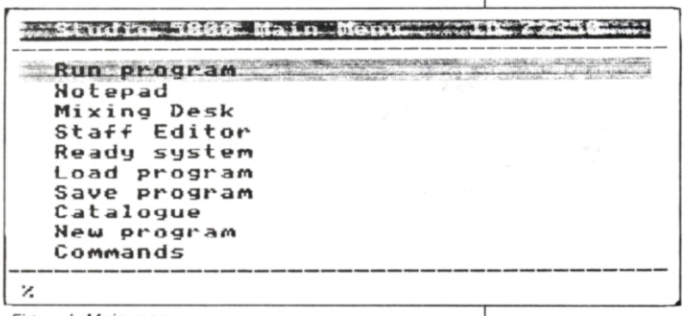

Figure I: Main menu

Turn to Page 54 ▶

alter its pitch and duration. The higher the note sits on the stave, the higher the pitch; the shorter the duration, the more tails it acquires.

Set the pitch and duration to match the first note shown in Figure II. Press Return to get another and adjust it to match the second note.

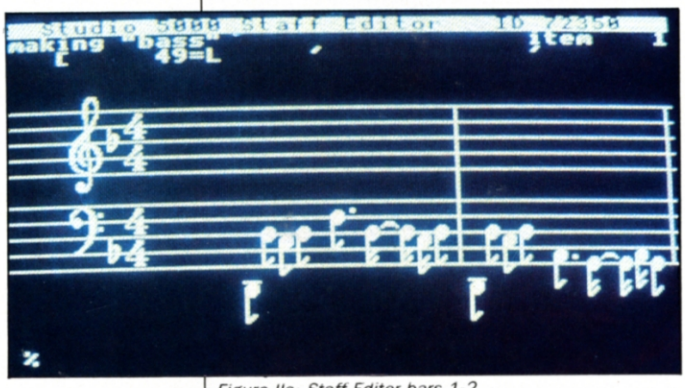

Figure IIa: Staff Editor bars 1-2

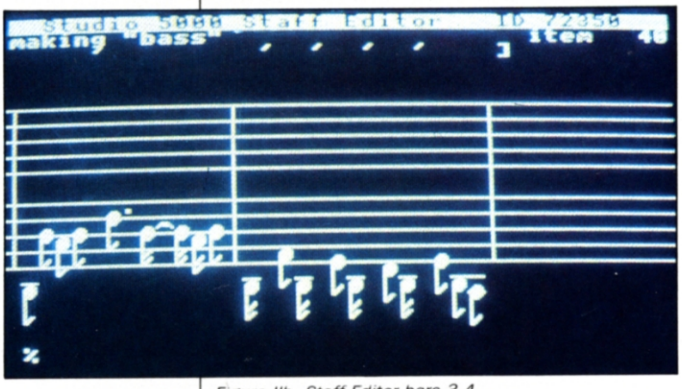

Figure IIb: Staff Editor bars 3-4

Carry on until you reach note five which has a dot after it. A dot extends its duration by a half and is entered by pressing the full stop after entering the note with Return.

The sixth and seventh notes are joined by a curved line – a tie which means the second is not played as such but its duration is added to the first note. Enter note six – it's of shorter duration than the others – press Return then press ~ (the tilde just below Break) and a tie will appear. Enter the seventh note as normal and they will be tied. Enter the remaining two notes then press I to insert a bar line.

To hear this now, in Command mode enter:

```
1 VOICES Slapbass
```

followed by Return. This tells the system there is only one voice or music line and which instrument to play it on. A chord, for example, would require two or more VOICES. Press Tab then press f1 and the bar should play. The system automatically checks the length of the bars. If it is not correct a *Bad bar* error will appear leaving you in Command mode. Press Tab and the cursor will appear above where the error occurred. Enter the notes in all four bars as shown in Figure II, ignoring the symbols above the stave for the moment.

Now, having got this into the system, there are lots of ways we can modify it. Let's alter the tempo – the default is 125. In command mode enter:

```
250=T
```

then play the piece. Try different values. Then play it on different instruments. Enter:

```
"CHANS"FIND
```

to list the available instruments. The FIND command displays the names of all the words which use the specified string and CHANS is used

PROGRAMS AND WORDS

AS in other languages, a complete sequence of Ample instructions forms a program. The basic unit in Ample is the word, and a word can be defined to perform any task. For example, it may hold music notes or an instrument definition. Ample uses post-fix notation so to change mode, for example, you would enter:

```
7 MODE
```

The definition of a word is enclosed in square brackets – [] – the ones which look like left and right arrows in Mode 7. Type in the following word which will restore default windows and clear the text area:

```
"cls" [26 #OUT 12 #OUT]
```

This is Ample's equivalent of issuing a VDU26,12 command.

Ample editors will form words from their edit screen almost automatically. The names of user-defined words are normally in lower case. Ample commands and instructions are also words but they are built into the system and to avoid confusion their names are in upper case.

User-defined word names can be 15 characters long but the screen displays will be clearer if you keep them down to nine characters or less.

SHOW produces a list of all user-defined words in a program. The tempo, articulation and instrument words aren't shown as they are built into the system. WRITE will list a complete program and individual words can be listed with the TYPE command:

```
"bass"TYPE
```

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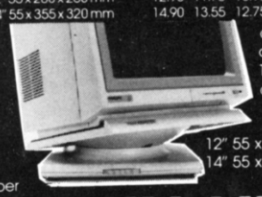

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◀ *From Page 54*

in all instrument definitions. Creating instruments, however, is beyond the scope of this series.

To alter the articulation of the piece – legato or staccato – use *Len* with a single number before it which sets the gate period – length of time a note is actually on – regardless of the actual duration of a note. A staccato note will be on for a shorter time than a legato note.

Position the block cursor above the first note and enter text mode by pressing the up cursor. The block will change to a straight line. Enter:

```
12 Len
```

and the notes will move along to make room for it. Leave Text mode by pressing unshifted down cursor then press f1 and you will hear the notes play staccato. Reposition the cursor and change it to:

```
0 Len
```

Now the notes play smoothly, legato. Try different values – the effect of the *Len* command will depend upon the instrument being used. Try *Organ* and *Upright* to hear the difference.

Rather than having to write *Len* commands above the stave, you can define words to do the job. In Command mode enter:

```
"st" [12 Len]
"lg" [0 Len]
```

Now you can use *st* and *lg* above the stave instead.

Enter Edit mode and Text mode again, move to the start of the notes and type:

```
49=L
```

The word =L sets the volume of the music – the default is 64 which is maximum.

A single quote mark above a note represents an accent. Insert it above the notes as shown in Figure II. An accent adds 15 to the volume level. You can define your own volume words:

```
"pp" [15=L]
"mp" [35=L]
"ff" [64=L]
```

Insert accents, volume settings and articulation words until you're happy with the way the music sounds. At any time during your experiments you can turn the piece of music into an Ample word. The editor will do this automatically, you only have two things to do. First, you must tell the program what you want to call the word. In Command mode enter:

```
"bass"NAME
```

You will see the top line change from:

```
making "newword"
```

to:

```
making "bass"
```

Next type in MAKE or press f3, and you will see the Ample equivalent of staff notation scroll up the screen. You can change names and MAKE pieces as often as you like. To edit an existing music word use GET:

```
"bass"GET
```

but this will only work in the Staff Editor if the piece was written on it or designed to be displayed on it.

You can save the program with:

```
"prog"SAVE
```

● *Next month we'll see how flexible the Notepad Editor is. Meanwhile, you may like to experiment further with the Staff Editor. If you NAME and MAKE pieces called part1, part2, part3, and so on, typing RUN will play them all together.*

The Hybrid Music System is available from Hybrid Technology Ltd., Unit 3, Robert Davies Court, Cambridge, CB4 1TP. Tel: 0223 316910.

"At any time during your experiments you can turn the piece of music into an Ample word"

STAFF EDITOR CONTROLS

General use	
Delete	Delete character before cursor
Copy	Delete character at cursor
Shift+Copy	Delete to bar line or end
Left, right	Move by one character
f1	Play music
f2	Copy to end of music
Escape	Stop music
Up	Text mode (line cursor)
Down	Symbol mode (block cursor)
Control+left/right	Move by one screenful
Control+up/down	Move to start/end

Symbol Mode (block cursor)	
Shift up/down	Raise/lower pitch of note
Shift left/right	Shorten/length duration of note or rest
Return	Insert note
@	Insert chord note
c	Insert clef
^	Insert rest
–	Insert flat
+	Insert sharp
=	Insert natural
k	Make key signature
.	Insert dot
2	Insert duplet figure
3	Insert triplet
d	Insert 6/8 time signature
t	Insert 3/4 time signature
q	Insert 4/4 time signature
Spacebar	Insert space
e	Insert end line
~	Insert tie/slur
|	Insert bar line

The plot thickens

Andrew Moore shows how to give your Z88 elementary graphics capabilities

THE Z88's clear, crisp supertwist LCD display is a joy to look at but there comes a time when you want to see more than just plain text. Graphical output, even in elementary form, can be extremely effective, be it bar charts for business, graphs for mathematics or pretty patterns for fun.

Most Basics come with a PLOT command – the basis of the high level interface to the graphics capabilities of the machine – but unfortunately, the Z88 doesn't. Or rather it does, but its action is simply to apologise for not being implemented.

In this article I will provide some Basic procedures to allowing plotting of chunky graphics, and demonstrate them with a program to display arbitrary mathematical formulae. Finally there's a routine to transfer pictures drawn using this system into Pipedream documents at an even lower, but nevertheless effective, resolution.

On the Z88 there seem to be two ways of creating graphics: Implement chunky graphics by means of User Defined Characters – UDCs – or use the Z88 map.

I've chosen the former, primarily because the map is so small on the unexpanded machine and even on an expanded one it can be no wider than about three inches. A second reason is that the map is inaccessible from Basic, and even if machine code is used, it requires meddling with some rather unsavoury parts of the operating system.

Let's look briefly at how the chunky graphics approach is implemented. It relies on using sixteen of the Z88's UDCs, labelled A to P – UDC's are fully described in the June issue of *The Micro User*. For our purposes each UDC is broken into four rectangles arranged into a two by two square.

For each (which we'll label *ASC"A"+i*) *i* is a four bit value and the colouring of the character is determined from these bits according to this diagram:

```
Bit 3  Bit 2
Bit 1  Bit 0
```

For example, character 4 – 0100 binary – is white with the top left hand quarter black. As it is not possible for Basic to read from the Z88 display, we do this ourselves, storing which UDC is in which screen location in a virtual screen – *SCR* which must be updated whenever we do a plot.

To try it out, type in the routines in Listing I, save them, and enter the following program:

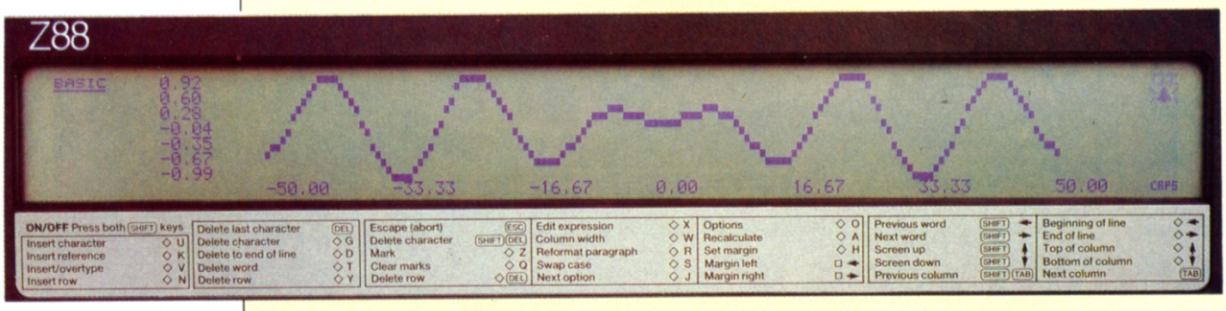
```
   10 PROCINITG
   20 PROCCLV
   30 REPEAT
   40 PROCPLOT(RND(180)-1,
RND(16)-1,2)
   50 UNTIL INKEY$(1)<>""
   60 VDU 1,67
```

Alternatively, you can run Listing II to demonstrate and test the routine of Listing I. This is a utility to plot arbitary mathematical functions of one variable – X – on the display.

You can supply the limits for the minimum and maximum values of X, and the program then chooses the optimal scaling for the X and Y axes. I recommend trigonometric functions – the long

Turn to Page 58 ▶

"There are two ways of creating graphics . . . User defined characters or the Z88 map"



◀ *From Page 57*

thin Z88 display is certainly suitable for demonstrating their periodicity – repeating pattern.

The details of the main procedures are:

PROCINITG initialises the UDCs and the virtual screen.

PROCCLV clears both the Z88 display, and the virtual screen and also switches off the cursor. To get the cursor back you must enter VDU1,67.

PROCPLOT(X,Y,C) plots at a position *X* chunky pixels from the left of the display and *Y* from the top. If *X* or *Y* are out of range nothing happens. If *C* is zero the pixel is plotted as white, if one the pixel is plotted black and it's inverted if *C* is two.

Finally, there is a short routine to copy a graphical display into Pipedream. This will not want anything to do with user defined characters, and so we have to go to the lower resolution of character sized pixels. The transferred image is converted to be 16 characters high, so at least we don't lose any vertical resolution.

After you have typed in Listing III, create a chunky graphics image to your liking – say by using the function grapher – and then go into Pipedream and place the cursor where you want the image to be drawn. It's necessary that there be only one Pipedream suspended activity.

Return to Basic, and enter PROCGRAPHTOPIPE – you needn't worry about writing over the graphics image on the display. Bizarre things will appear to happen for a while, but when the *FINISHED message appears you can return to Pipedream and you'll find the graphics image has been transferred.*

How is this done? As you may notice from the listing I've made use of the Z88's CLI. This is almost a language in its own right, and has the combination of properties which can bring a gleam to the eye of any ardent micro enthusiast. It is arcane dangerous, extremely powerful and very useful.

● *Next month I will explain how the CLI can be used and explore some of its possibilities.*

```
  10 REM Graph Plotter by Andrew Moore
for Micro User.
  20 PROCINITG
  30 DIM Y(150):@%=&00020203 : REM @% C
ontrols number format
  40 CLS : PRINT "Please enter an expre
ssion with X as a free variable"
  50 PRINT "For example:    SIN(X/3) *
SIN(X/20)":INPUT XPR$
  60 INPUT "What value of X should I st
art from (e.g. -50.0)";MINX
  70 INPUT "What value of X should I en
d at (e.g. 50.0)";MAXX
  80 MINY=1E20 : MAXY=-1E20
  90 CLS : FOR I = 0 TO 150 : X = MINX
+ I * (MAXX - MINX) / 150
 100   IF I MOD 30 = 0 THEN PRINT 2*I/3
"% Done"
 110   Y(I) = EVAL(XPR$)
 120   IF Y(I) < MINY THEN MINY = Y(I)
 130   IF Y(I) > MAXY THEN MAXY = Y(I)
 140 NEXT I
 150 PROCCLV
 160 FOR I = 0 TO 6 : PRINT TAB(0,I);MA
XY-I*(MAXY-MINY)/6;
 170   PRINT TAB(10+I*12.5,7);MINX+I*(M
AXX-MINX)/6; : NEXT I
 180 FOR I = 0 TO 150 : Y = Y(I)
 190   PROCPLOT(I+20,INT(13.99*(MAXY-Y)
/(MAXY-MINY)),1)
 200 NEXT I
 210 VDU 1,67 : @% = &90A : END
```

Listing II: A demonstration for the plotting routine

```
 5000 DEF PROCBC(X)
 5010 T = 128 + 56 * ( X AND 1 ) + 3.5 *
 ( X AND 2 )
 5020 B = 128 + 14 * ( X AND 4 ) + .875
* (X AND 8)
 5030 VDU 1,&8A,&3D,65+X,T,T,T,T,B,B,B,B
 5040 ENDPROC
 5050 DEF PROCINITG
 5060 SCRSIZE = 94*8-1 : DIM SCR SCRSIZE
 5070 FOR I = 0 TO 15 : PROCBC(I) : NEXT
 I
 5080 ENDPROC
 5090 DEF PROCCLV
 5100 PRINT "Clearing Virtual Screen.."
: VDU1,127,1,ASC"S"
 5110 FOR I = 0 TO SCRSIZE : SCR?I = 0 :
 NEXT I
 5120 CLS : ENDPROC
 5130 DEF PROCPLOT(X,Y,C)
 5140 LOCAL U,V,P
 5150 IF X < 0 OR Y < 0 OR X > 187 OR Y
> 15 THEN ENDPROC
 5160 U = INT(X/2) : V = INT(Y/2)
 5170 PRINT TAB(U,V); : U = V * 94 + U
 5180 P = (X AND 1) + 2 * (Y AND 1) : P
= 2^P
 5190 IF C = 0 THEN P = SCR?U AND (NOT P
)
 5200 IF C = 1 THEN P = SCR?U OR P
 5210 IF C = 2 THEN P = SCR?U EOR P
 5220 VDU1,130,63,65+P : SCR?U = P : END
PROC
```

Listing I: The plotting routine

```
 6000 DEF PROCGRAPHTOPIPE
 6010 PRINT "Wait a moment.." : OUTCH =
OPENOUT ":RAM.0/DELETE.ME"
 6020 FOR Y = 0 TO 7 : FOR M = 3 TO 12 S
TEP 9 : A$ ="" : FOR X = 10 TO 85
 6030       IF (SCR?(Y*94+X) AND M) THEN
 A$ = A$+"*" ELSE A$ = A$+" "
 6040    NEXT X : PRINT #OUTCH,A$ : NEX
T M : NEXT Y : CLOSE #OUTCH
 6050 *CLI #PIFL:RAM.0/DELETE.ME~DY~D~DY
~E#B
 6060 I = INKEY(0) : *DELETE :RAM.0/DELE
TE.ME
 6070 PRINT "Finished" : ENDPROC
```

Listing III: Graph to Pipedream routine

Inside story

John Allen reveals the Z88's intimate details

Q *Why does the BAT LOW sign sometimes come on when you plug in the mains adapter?*

A As the plug of an adapter is inserted into anything that is battery powered there is a short pause between the device taking its power from the batteries and it being supplied by the adapter. If that is not plugged into the mains, connecting it will usually disconnect the power to the device completely.

But the Z88 has to have power continuously to retain its memory. There's a capacitor inside that holds enough power to bridge the gap when the plug is inserted – it also powers the micro as you change the batteries – and there's also a diode which allows the supply to revert to the batteries if the adapter is connected but not plugged in to the mains. This diode has a voltage drop of nearly 1 volt.

A set of new batteries starts at approximately 6.5v and the BAT LOW warning comes on when this has fallen to 4.5v. But the first thing that happens as you plug in the mains adapter is that the direct battery power supply is cut and replaced by the one via the diode, so the BAT LOW indicator comes on if your batteries are down to 5.5v.

Although the mains adapter supplies 6v the indicator remains set. Turning the machine off and on again will clear it.

Q *Your article on using the printer in the April 1988 issue of* The Micro User *showed how to print but how do I get effects such as bold in the output?*

A You can send the codes to control your printer directly using VDU, PRINT# or BPUT#. But the easiest way is to use the Z88's printer driver which is already programmed with the codes. This only works if the printer is set up as a file by using:

```
X% = OPENOUT":PRT.Ø"
```

and sending the text using BPUT#X% and PRINT#X%. The printer driver is operated by the ENQ character – Ascii code 5 – followed by a character to say what should be done. The most useful of these are shown in the table.

ENQ,[	Turn printer driver on
ENQ,]	Turn printer driver off
ENQ,U	Highlight 1 – Underline
ENQ,B	Highlight 2 – Bold
ENQ,X	Highlight 3 – Extended sequence
ENQ,I	Highlight 4 – Italics
ENQ,L	Highlight 5 – Subscript
ENQ,R	Highlight 6 – Superscript
ENQ,A	Highlight 7 – Alternate font
ENQ,E	Highlight 8 – User defined

You need to bear in mind that the printer driver will turn most of these effects off after a Return which is sent following each PRINT# statement.

To use an effect the printer driver first has to be turned on by:

```
BPUT#X%,5 : BPUT#X%,ASC"["
```

Effects can then be sent either by using BPUT# in a similar way or by incorporating the characters into the PRINT# line. For example:

```
10 ENQ$ = CHR$(5)
20 PRINT#X%,"Normal "+
ENQ$+"B"+"Bold "
```

will print Normal and Bold on the same line.

Q *Will all BBC Micro Basic programs run on the Z88 provided there's no graphics in them?*

A Unfortunately no. Apart from graphics there are three other areas of difference between the two Basics. For a start, with the exception of the Ascii characters, the Z88 VDU drivers use totally different codes from the BBC Micro, for instance VDU2 does not turn the Z88's printer on – there are several different methods of printing from Basic on the Z88 and we'll cover them in future issues. Also, most Oscli or star commands

Turn to Page 60 ►

Hint

When your Alkaline batteries are "flat" – the screen display won't work – the memory is retained for up to one month by the small amount of power left.

With re-chargable batteries this time can be as low as 12 hours, so while they work out cheaper you should use them with caution.

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are different which means, for example, that *FX commands cannot be used on the Z88.

The third area is a little more subtle: Basic on the BBC Micro uses separate stacks for the return addresses of different types of control structures – FOR...NEXT, REPEAT...UNTIL and so on – making it tolerant of poor program design. There is just one stack on the Z88 so some programs will run on the BBC Micro but not on the Z88. Take a look at the following:

```
10 PROCtest
20 PRINT "Main Program"
30 END
40 DEFPROCtest
50 FOR I = 1 TO 10
60 IF I = 6 THEN ENDPROC
70 NEXT
80 ENDPROC
```

Here the FOR loop inside the procedure never completes – the value of *I* never reaches 10. A BBC Micro will return from the procedure to the main program and execute line 20. However, the Z88, quite correctly, gives the error message:

```
No PROC at line 60
```

because ENDPROC cannot be executed before the FOR return address has been pulled off the stack.

Q *The Z88 seems capable of handling vast amounts of memory. How is this organised?*

A A combination of two techniques are used: There is bank switching, which is like the BBC Micro's sideways ram. The Z80 microprocessor at the heart of the Z88 – like the 6502 in the BBC Micro – can only handle 64k of memory directly. To allow more, different chunks of ram and rom are switched in and out of the main memory when they are required.

In addition, application workspace and files are located in fragmented ram. The fact a file is 995 bytes long it doesn't mean that a consecutive 995 bytes are used to store it – the file can be fragmented into a number of pieces anywhere in ram. Of course, a file won't be fragmented across a ram device – otherwise you could unplug a cartridge and lose half a file.

The exception to all of this is BBC Basic, which was written before the Z88 was designed and requires a continuous block of memory.

When you call Basic the operating system will find up to 40k of continuous memory for it and if necessary other activities are moved to a different part of memory. When you leave Basic everything is restored to its previous position and the Basic activity is collapsed into the smallest space it can occupy, plus about 2k for a copy of the screen.

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PROBLEM SOLVED

The missing line

MY Brother M1009 dot matrix printer prints out with a gap running along the middle of the letters. What would you advise me to do?

Also, my function keys are not working properly. When I use them in a program to display coloured letters they seem all right, but when I list the program, different statements come up instead. – **H.R. Baijee, Forest Gate, London.**

● *The problem with your printer is that a needle is blocked or broken. This is most likely due to ink clogging up the hole it passes through, so carefully disassemble your print head and clean it in alcohol. If the problem persists it could be the solenoid or its driver at fault.*

As to the function keys, if the colour control characters are inserted directly in the program they are interpreted as Basic keywords when you list them. That, and the fact that we can't print them in The Micro User *is why it is always best to use the CHR$(X) statement for Mode 7 control characters.*

Half-formatted discs

I RECENTLY updated my Model B with a Watford Mk2 DFS interface and a CS400S disc drive, but I am having some problems formatting discs with 80 tracks – single or double density. The head appears to come to the end of its travel just over halfway through the formatting procedure and reports back something like *Sector 00/02 not found.* – **P. Stonebridge, Ipswich.**

● *It sounds very much as if your disc drive is only a 40 track one. This would explain your problem.*

More micro colours

IS there any way of creating your own screen modes, such an eight colour Mode 1? I understand that this would take up more memory, but could shadow ram be used? – **Antony King, Borstal, Kent.**

● *You can get a so-called Mode 8 which has all the colours but half the resolution of a Mode 2 screen. Full details of this are given in the Advanced User Guide. However you can't get more colours or more resolution simply in software.*

It is not just a question of having extra memory available but how that memory is wired up inside the machine. Without completely replacing the video ULA, cutting tracks and adding a lot of extra logic, there is no way of improving the display.

Accessing telesoftware

I HAVE a BBC B fitted with the Acorn 0.9 DFS and an 80 track disc drive. As a monitor I use a TV which has teletext installed. What do I have to add to be able to access telesoftware? I am a novice and am bewildered by all the literature on teletext adapters. – **Anne Stuart, Sunbury-on-Thames, Middlesex.**

● *Unfortunately there is no way to connect the teletext circuitry inside your TV set to the Micro. Therefore if you want to download telesoftware you will have to get a teletext adapter like the Morley one advertised on Page 45. All the information you need to download telesoftware comes with the adapter.*

A bite at an Apple

I OWN a Master Compact but I have a lot of software on 5.25in discs. I also have an obsolete Apple II+ with two 5.25in drives. Would it be possible to connect one or both Apple drives to my Compact? – **Alistair English, Staveley, Nr. Kendal, Cumbria.**

● *Apple disc drives are unique in the field of computing as they do not contain the electronics used in conventional ones. The functions of the control board were performed by the software, making Apple drives cheap, very slow and, unfortunately, totally unusable on any other system.*

Picture break-up

I AM using a remote monitor as an information board in an entrance foyer. With a three metre lead I get a good display, but with a 10 metre one – which I would like to use – the picture breaks up. Can you help please? – **David M. Sims, Stockport College of Technology, Stockport, Cheshire.**

● *The problems with sending the four necessary signals over separate long leads is that they all arrive at different times and the signal suffers, due to the high capacitance of the lead. You*

Turn to Page 62 ▶

On the agenda...

- Clogged print head
- Disc formatting trouble
- New multi-colour modes
- Breaking up display
- Trouble with joysticks
- Persistent noise and flicker
- Micro battery backup
- Using 80 track drives as 40
- Receiving telesoftware
- Using Apple disc drives

◀ From Page 61

could try replacing each signal lead with a low loss co-axial cable – not the type sold for TV aerials, as these are often only low loss at high frequencies.

The best solution might be the sort of cable that consists of four separate screened co-axial leads. They use this type of cable in professional TV studios but it might be that the BBC Micro will not have enough drive to push the signal that far even with good cable.

Perhaps the cheapest solution would be to use the modulated output of the micro to drive a TV set. In this way most of the problems are circumvented.

Battery operation

I WOULD like to construct a new power supply for my BBC B incorporating a standby 12v rechargeable battery. The disc drive – powered by the micro – requires only 36mA at 5v and a full board is fitted.

From experiments, I have found that the micro can be run off a non-switched mode power supply but can this cause any problems if continuously used for prolonged periods?

Also, should the supply be connected to all three positive and negative connections on the motherboard, or would only one be sufficient? Finally, what current capacity should the power supply have? – **A. Clark, Sittingbourne, Kent.**

● *A battery switch mode power supply was described in the April 1987 issue of* The Micro User. *I am surprised that you have a disc drive that takes so little current – are you really sure of this? The problem with a conventional series regulator design is that it dissipates too much power and so will run hot. The BBC Micro takes about 2.5 amps at 5 volts, so you will need to dissipate about 18 watts – the same amount of heat as a small soldering iron.*

You have to connect the power to all three leads on the board to get the correct distribution impedance. Finally, if you want the sound, cassette and serial interface to work you have to supply a –5 volt supply at about 100mA.

80 into 40 will go

I HAVE recently bought an 80 track non-switchable disc drive for my BBC Micro. It works perfectly and I can use my old 40 track discs on the new drive by a software fix. My problem is that when I connect both drives to my micro using a two into one adapter I can only use either the 80 track or the old 40 track drive, but not both together.

I assume the software fix makes the 80 track

drive double step and this must alter the 40 track stepping so the discs on the 40 track drive become unreadable.

Can you suggest another software fix or, even better, a way to make my 80 track drive switchable? – **Alan M. George, Cockett, Swansea.**

● *There are two ways you can solve your problems The first is to use the disc switcher board – Body Build pack 2 – described in the October 1985 issue of* The Micro User. *The second way is to use a DFS like the Watford one which allows individual drives to be switched; the latest versions will automatically adjust to the type of disc you have in the drive.*

Impending doom

I OWN an issue 3 BBC B and recently I have started to get a sort of rustling noise from the loudspeaker. I then noticed that when this happened the screen gave a slight shimmer.

Although not a serious fault – it does not affect the micro's performance – it does get annoying. I would be pleased if you could give me any help on this matter – **Andrew McIntyre, Tranent, East Lothian, Scotland.**

● *The persistent sound crackling and picture flickering are signs of impending doom: It sounds as though there are rapid fluctuations in the power supply. These are too fast to affect the operation of the micro, so it will still work.*

A typical cause is a smoothing capacitor breaking down, and the short circuit current causes the electrolyte to reform so the capacitor continues to function a little longer.

Eventually it will break down permanently – when it will be easier to locate and replace. It is probably located in the switch mode power supply.

Analysing an analogue fault

I HAVE a joystick for my BBC Micro and after a year it seemed to fail, so I took it back and it was replaced with another of the same make. This one developed the same fault – or so I thought – as did the next few.

I realised that all these joysticks couldn't be faulty, so I tried a test program and got the reply that the joystick was not plugged in. If I waggle the plug I can get a positive reply, but it is almost impossible to keep it in that position. If I select joystick on Elite, I dive and spin to the right. Could you help me please? – **Chris Betterton, Dunstable, Beds.**

● *Clearly your micro is at fault and not the joysticks. It could be a fault on the socket of the analogue input port itself caused by a cracked track or bad solder joint nearby. From your description it sounds like a faulty earth connection.*

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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Your BBC Micro's eye on the world's weather

Robin Nixon takes a look at new high resolution satellite maps

WEATHERLINK is a unique service for subscribers to MicroLink. Using state of the art technology it provides detailed maps of the world's weather taken directly from orbiting satellites. Recently the service has been enhanced to include very high resolution maps in up to 16 different colours or shades of grey on an Archimedes or eight on a BBC Micro.

It offers daily updates on the weather over Britain and Western Europe and brief summaries of each map.

There are also a number of demonstration maps covering the Mediterranean, North and South Africa, France and Spain. Shortly it is hoped that a regular weekly update of holiday spots will be made available, so you can see exactly what sort of weather to look forward to.

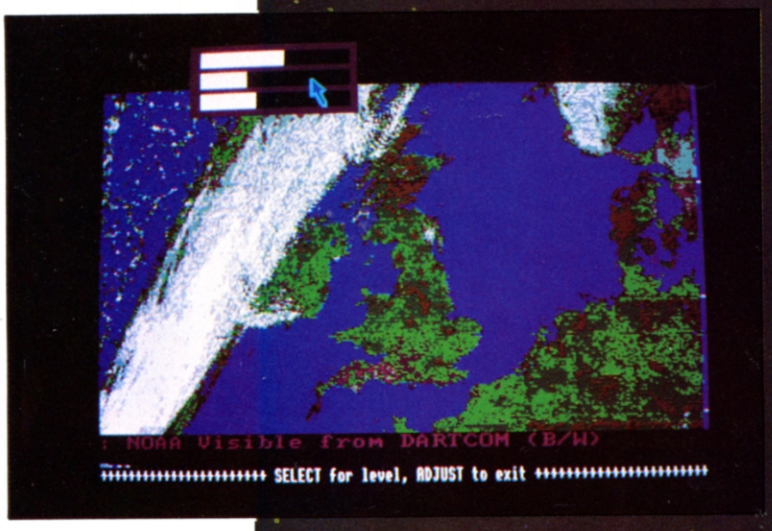
For anyone not familiar with MicroLink or the WeatherLink section, extensive help is available. Setting up your micro to receive the maps is a very easy process which you are guided through step by step, while downloading the maps themselves consists of merely typing the name of the day for the map you wish to receive.

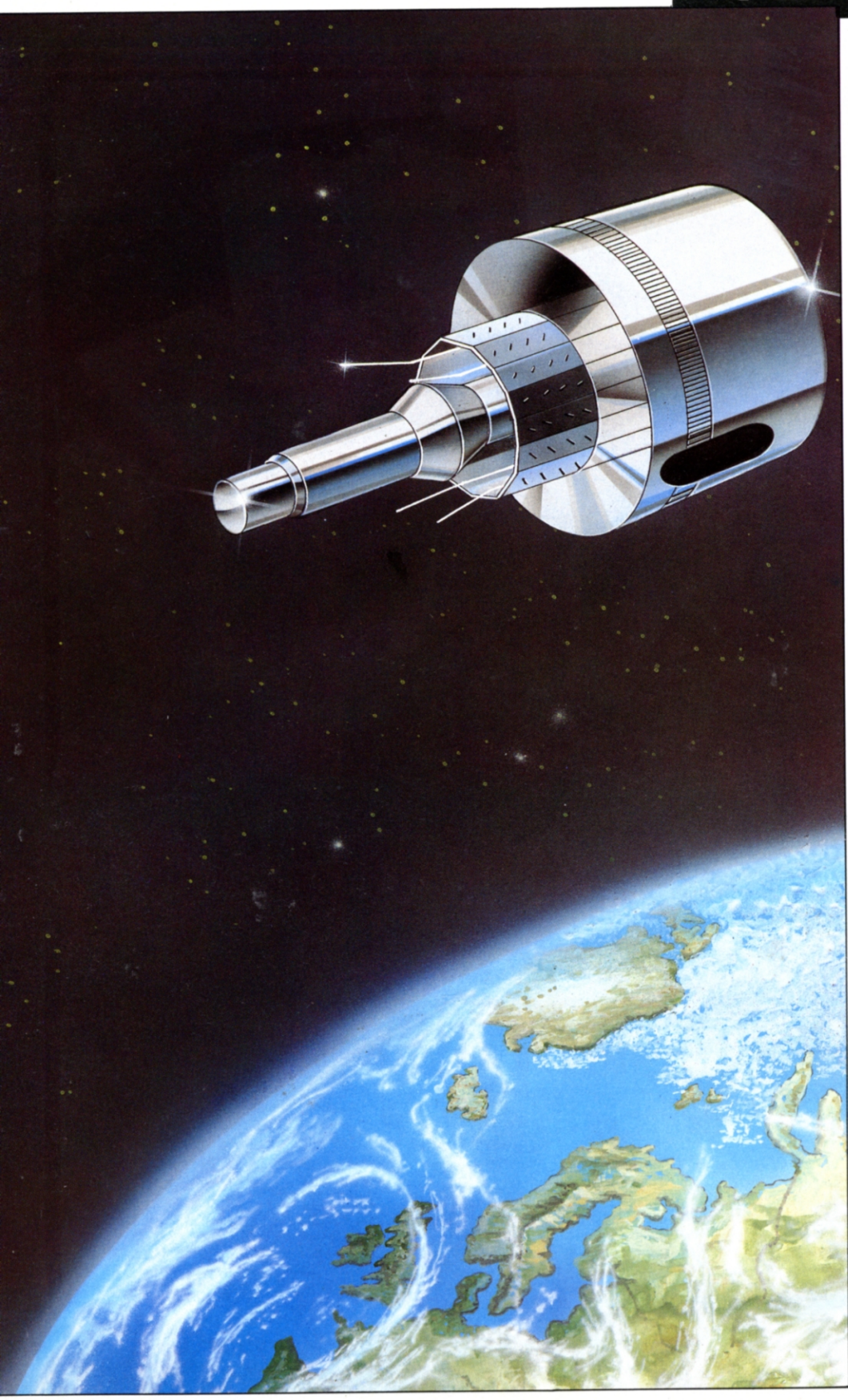
There are two types of weather satellite: Polar orbital and geostationary. Examples of the polar satellites are the North American NOAA series and the Russian Meteor and Cosmos satellites. As the name suggests, they orbit the Earth passing over the North and South Poles with an orbital period of around 100 minutes, and are between 600 and 800 kilometers – 400 to 500 miles – above the Earth's surface.

The European geostationary satellite, Meteosat, circles the globe around the equator. However, it has an orbital period of 24 hours and so appears to Earth observers to be stationary – over the Greenwich meridian. It is about 36,000 kilometers – 24,000 miles – above the equator.

The NOAA series of satellites transmits visible light and infra red images, while Meteosat has a timetable of four minute slots for visible light, infra red and water vapour images.

Normally to receive these pictures you need some very expensive equipment, including aerials, decoders, computers and display units. However, with the help of WeatherLink, all you need to view the maps is your BBC Micro, a modem and a subscription to MicroLink. At 1200/1200 baud each map only takes between four and five minutes to download – costing less than 20p at cheap rate for a satellite's view of earth.





The WeatherLink display program and demonstration maps are available on this month's Micro User disc
See order form on Page 135

THE MICRO USER MAIL ORDER OFFERS

Obtain FREE software at any time with this teletext receiver

With the Morley Teletext Adapter you can download software whenever you like at no charge whatsoever. Programs are updated every week and range from educational and utility software to exciting games.

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The Morley Teletext Adapter is the most popular unit on the market with more than 10,000 satisfied customers – including the Department of Transport who use it to display weather maps at service stations throughout the country. It plugs straight into the user port, includes menu-driven software and automatically tunes itself to the required channel.

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IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting. They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service during office hours on 01-927 5040.

TO ORDER TURN TO THE FORM ON PAGE 135

U·P·D·A·T·E

Compact prize

SUTTON comprehensive school in Ellesmere Port, Cheshire, has won a Master Compact donated by Acorn in the county's Career Countdown 88 competition. The Duke of Westminster handed over the micro, won in competition with 109 other secondary schools, during a visit to Sutton.

Organised by the Manpower Services Commission, the competition was launched last November to encourage school leavers to visit education and training exhibitions throughout Cheshire. Entrants had to produce a guide for future visitors, highlighting the uses, importance and aims of careers conventions.

Sutton comprehensive's winning entry was a video explaining how to benefit from the conventions, and a series of pocket-size guides. Both ideas are to be adopted by MSC.

The Duke of Westminster (centre) presents children at Sutton Comprehensive School, Ellesmere Port, with their Acorn Master Compact prize.

Archimedes helps literacy project

A POWERFUL tutoring program with a difference is the latest project to be embarked upon by System Applied Technology (0742 768682). It will help adult literacy course participants learn a variety of language skills, as well as how to fill in forms and write CVs.

The Manpower Services Commission-funded project will be centred on a word processor tailor made for the needs of literacy students and will run on an Archimedes.

Linked to an extensive database, it will offer the student a wealth of learning material. Under the forms option, for example, a variety of areas will be available – including tax returns, passport and job applications. Other options contain sample letters, curriculum vitaes and other reference text.

Artificial intelligence techniques will enable the micro to tell students what is wrong with their work. The system will then draw attention to the need for tutoring in comprehension, style, punctuation, spelling, layout, proof reading and vocabulary.

The training strategy within the system will not be fixed – the micro will collate information about the student's abilities and weaknesses and provide guidance through the learning tasks.

But the computer will not force students to take its advice – at all times it will judge when help is required and offer it.

The Archimedes-based system will be wysiwyg with high resolution graphics and a colourful and pictorial interface.

Phonics package

TEACHERS of reading generally agree that children should learn whole words to build up a sight vocabulary of around 100 common words. One strategy is to provide systematic instruction in phonics, giving children of ages six to eight the skills to build up new words and extend their vocabulary.

Letters and Pictures, a new package from Chalksoft (0775 69518), is intended as a tool to start off this phonics work. Designed by experienced teachers in reading, the seven-program disc employs powerful graphics. The child uses only two keys to select a letter to match a picture – the initial letter, final consonant or middle vowel – building whole words in the final section.

When a child indentifies the picture he is shown he presses the spacebar to move a pointer to the appropriate letter and then presses Return.

If correct, the child is rewarded by animation of the pointer and sound effects. If the answer is incorrect the micro bleeps and the pointer disappears, returning a few seconds later for another try. When all the pictures in a program have been matched there is a colourful on-screen reward with sound effects.

Letters and Pictures on 5.25in disc for the BBC Micro and Master costs £13, on 3.5in disc for the Master Compact £15.

Programs of note

Ian Waugh investigates packages aimed at easing music practice

Product: NotePerfect I
Price: £9.95
Supplier: NotePerfect Software, 97 Valence Road, Lewes, Sussex BN7 1SJ.
Tel: 0273 473135

MUSIC is a subject which lends itself to computer assisted learning, especially on a BBC Micro which has a built-in sound chip. NotePerfect aims to take advantage of the chip by providing a set of scale exercises the music student can follow and play.

The idea is a fairly simple one. The micro plays the scales and the student must follow them, thus helping develop his sense of pitch and articulation – an essential part of Associated Board music exams.

The program was designed specifically for flute, oboe and violin players but it could also be used for trumpets, piccolos, clarinets, cor anglais and viola players too.

When you boot it up, you are presented with a list of 10 options: Tune up, major scales, minor scales, major arpeggios, minor arpeggios, dominant 7ths, diminished 7ths, chromatic scales, major double stops and minor double stops, the last two being only relevant to string players.

Tune Up is used to tune your instrument to the BBC Micro's sound chip. This section is designed for the violin and offers A, D, G and E notes to tune against. Others could simply tune to the A.

The program, however, obediently uses a value of 89 in the SOUND command – as mentioned in the user guide – to produce the A pitch. This value produces a pitch of 449.3 Hz, not 440 Hz – the internationally accepted pitch of A. A value of 88 would be closer – 443.1 Hz – although even this is still not close enough for anyone with a half decent musical ear. If you use this program you must be prepared to tune your instrument to the sound chip and then back to international A to play with other instruments. This is a nuisance to say the least, especially if it is difficult to tune or you would rather not to be constantly retuning it.

When you select one of the scale options the program asks you. What key, how loud, how fast, how many octaves and how many times? This is fine, but it asks you all these questions *every time* you select a new scale. You should be able to set all these options – except the key – at the start of a session. Also, it would be helpful if you could enter a number of scales at once. For instance all the major scales incrementing chromatically, so you could play through a complete series of exercises without stopping.

Although the sound chip only has a range of five octaves, the program lets you input any number in answer to the 'How many Octaves?' question. If it is outside the sound chip's range the pitch wraps around.

When in a sub-menu, Escape takes you back to its start and Break is supposed to take you back to the main menu. In some sub-menus, however, the Break key is configured as *RUN SCALES – which is the main menu program – but it's a Basic program so it crashes. The sub-programs are rather short anyway and all 10 could probably be fitted into memory at once.

This sort of thing sums up the programming side of NotePerfect extremely well – extremely sloppy. The presentation is functional – barely – and there are few, if any, checks made on user input. The key must be entered as a capital letter and if you enter c instead of C for example, it runs you through the speed, loudness, octaves procedure before realising the mistake and then simply plonks you back at the start of the questions again. Questions requiring a Y or N answer will scroll up the screen if you enter anything else.

The range of scales, however, is good and the minor selections give you the choice of harmonic or melodic minor – but yet another prompt to reply to. Practice Sheets are included with the program – you may photocopy them – and you can record your progress on them.

NotePerfect have Site Licence Options for both schools and LEAs. Costs range from £35 for schools up to 500 pupils up to £10 per school for LEAs with more than 25 schools.

To sum up, NotePerfect is a nice idea but badly implemented. The aim of a CAL program should be to help and encourage pupils to learn and practice. It certainly wouldn't encourage me if I had to enter all that information before *each* exercise.

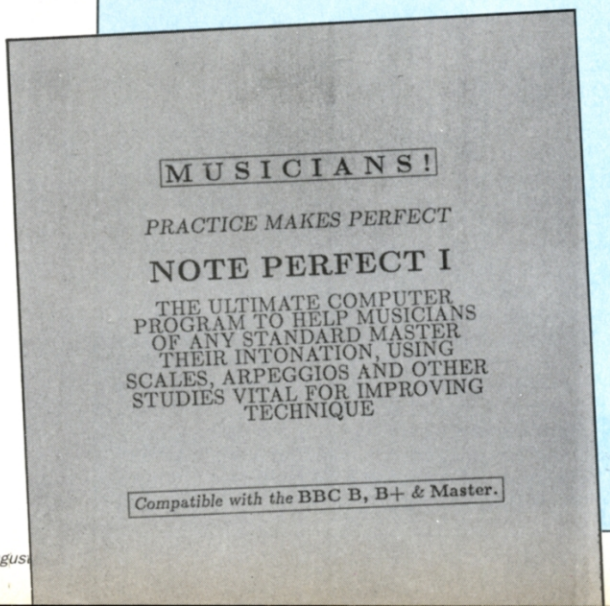
If you – or any of your students – are finding scale practice a real problem the program could be a help and, as it doesn't cost an arm and a leg, it may be worth investigating. I had hoped, however, that educational software had improved beyond this backroom development stage.

Points for

- Value for money
- Good exercises

Against

- Poorly pitched
- Careless programming



B B+ MM

Product: Aural
Price: Grades 1 & 2 together £16.65 (cass), £18.45 (5.25in disc), £19.85 (3.5in disc). Grades 3, 4 & 5 individually £14.85 (cass), £16.65 (5.25in disc), £18.45 (3.5in disc)
Supplier: Perfect Fourth Software, 11 Hempstead Lane, Potten End, Berkhamsted, Herts HP4 2QJ.
Tel: 04427 6311

THE aural part of any music examination is often the most unpopular with students. It can also be the most difficult to practise as another person is usually required to play some notes and ask questions. Aural sets out to ease the practice problem by using the computer to provide a series of exercises the student can do at home.

It was specifically designed for individual use and although Perfect Fourth says it could be used in a classroom, it is not, I think, so well suited to group use. The program boots from disc and, as a form of copy protection, asks you for a three-letter code which must be read from one of 676 on a Loading Card. The manual warns that if you lose the card you'll have to buy another program although the cards and codes for each of the programs are the same.

The program uses Mode 7 and all on-screen instructions are in upper case – I thought software had progressed beyond the big letters stage. It also addresses you as if the micro is talking and periodically throws out such comments as "Are you singing?" and "Nice and loud, I can't hear you". You can enter your name and if you do it will be tacked on to the end of some of these messages. OK for the under fives, I suppose.

We'll start with Grades 1 and 2: The first option plays the major scale to remind you what it sounds like. Next the program plays a note and you must sing it. The third option plays a key note and then one of the first five notes of the scale which you must name. The fourth option plays a short tune and you must clap the rhythm of it.

Grade 2 develops the exercises and adds Scale Singing in which you must sing a certain interval of the scale. It also adds Sing Three Notes which is a prelude to the other grades which ask you to sing a short melody.

Each exercise gives you four tests of its type after which you can try another four or go back to the main menu. The manual says the options are numbered 1, 2, 3 and so on, but the program uses letters. Also the Sing Three Notes exercise in Grade 2 appears as second choice in the manual but last choice on the program menu. Although admittedly minor points, the lack of agreement between software and manual never ceases to amaze me. Is it so difficult to get the two to match up?

When you reach Grade 3 there are exercises in which you must sing the upper or lower of two notes which are played together, sing notes of the scale, sing short melodies and clapping exercises.

Grades 4 and 5 introduce slightly more complex questions, longer melodies and larger intervals.

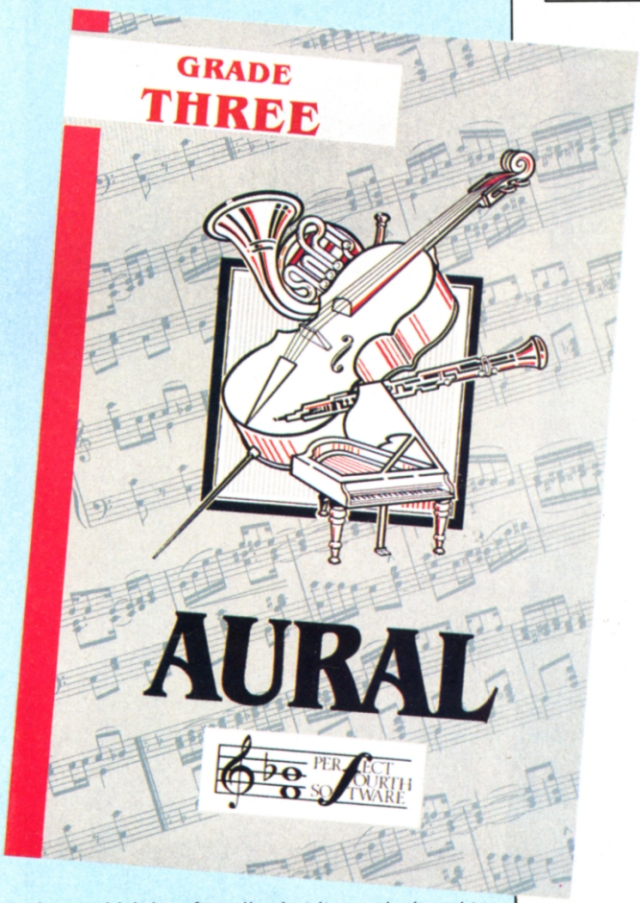
All grades have three beating time exercises. These play a short tune and you must beat time to it. The answer is supplied by an arrow which points in the direction you would move a baton if you were conducting. The time signatures aren't given, though, which would have been helpful. As these are three-part tunes, you only get a few per exercise, unlike the scale and interval tests which can produce countless variations using the random number generator.

None of the exercises can accept feedback from the user – they are presented purely for you to practise on your own. The only way you can tell if your answers are correct or not is by using your own ears. As this is what the program is trying to develop it is, in a way, like marking your own examination paper. To get the best out of the exercises it will be important to get your progress checked by a teacher.

The presentation isn't particularly exciting – bland Mode 7 screens and inane comments – although the packaging is good. All the programs contain a "These Music Exams" leaflet included with the permission of the Associated Board and a Music Student's Practice Diary. The leaflet is excellent reading and the Diary can serve as an incentive to monitor and improve your progress.

The software provides practice rather than tuition – which is, after all, what it was designed to do – and is not a substitute for a good teacher. It also strikes me as being a touch pricey which may deter potential users from buying it. However it is aimed at a specialised market and that usually seems to justify a higher than average price tag.

There's no doubt these programs could help improve your aural ability but you'll need the will to work through them.



Points for

- Handy leaflet and diary
- Useful practice programs

Against

- Bland screen displays
- A bit pricey

The bottom line...

Neither program really stands out but both work satisfactorily

Archimedes
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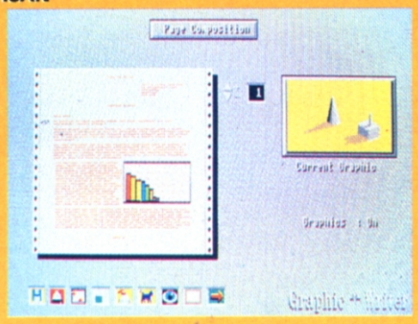
Graphic Writer

£29.95

Graphic Writer, formerly Image Writer, is a sophisticated WIMP based word processor with an inbuilt graphics editor. It can be used as a standard word processor or graphics can be included to provide diagrams, graphs etc within your document. Graphics can even be imported from **ARTISAN**



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To create a document with **Graphic Writer** you type in your text, using the many text styles available, leave room for the graphics and then place the graphics using Page Composition. It's simple and easy to use. You can have up to 14 documents in memory on a 310, that's equivalent to about 220 pages of A4 text.

See what the magazines say:

> the scrollling is unbelievably smooth... I can highly recommend this excellent product as being **THE** word processor for the Archimedes
>
> *MICRO USER April 1988*

> excellent value... bowled over by its stunning use of graphics.
>
> *RISC USER December 1987*

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Riddle of the sands

Jon Perry presents Treasure Trail, an educational search for the Pharaoh's gold

IN the trackless wastes of the Sahara Desert you stand alone with your map. Hidden in the shifting sands is the Pharaoh's treasure, and you are determined to find it. But with a three month time limit and a limited supply of food and water can you survive?

This educational game not only encourages logical thinking but also gives lots of practice with compass directions and coordinates.

With 100 locations to search and only three opportunities to dig, you need as much help as you can get. Fortunately you have six clues giving an approximate direction to the treasure. But to get a clue you must answer a compass or coordinate question correctly. You can also re-stock with food and water by passing over an oasis, each marked as a blue square.

To enter instructions press the appropriate key and hit Return each time you want to send that command. When answering a compass question press the spacebar to move the pointer of the compass display. Coordinates are entered with the number keys – the squares in each direction are numbered zero to nine. The X coordinate should be entered first.

Happy hunting. May your oases be plentiful and your fortune good.

MAIN PROCEDURES

init	Initialises variables, characters and trig tables	**dig**	Digs for treasure
		clue	Gives a clue
		comp	Gives compass question
game	Runs the game	**coord**	Gives coordinates' question
screen	Draws initial screen	**direction**	Finds and displays direction of treasure
input	Accepts command		
action	Interprets command	**end**	End of game
move	Moves the player	**done**	Draws a picture

COMMANDS

Cursor up or N	Go north
Cursor down or S	Go south
Cursor right or E	Go east
Cursor left or W	Go west
D	Dig for treasure
H	Help!
Spacebar	Rotate compass point

```
   10 REM Treasure Trail
   20 REM by J.Perry
   30 REM (c) The Micro User
   40 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   50 MODE 5:*FX4
   60 Z%=RND(-TIME)
   70 VDU23,1,0;0;0;0;
   80 PROCinit:PROCgame
   90 IF FNanother:RUN:ELSE:*FX4
  100 END
  110 DEFPROCinit
  120 end=FALSE:V%=0:K%=0
  130 di=0:da=0:f=9.5:X%=0:Y%=0
  140 REPEAT Tx%=RND(10)-1:Ty%=RND(10)-1
  150 UNTIL NOT FNpool(Tx%,Ty%)
  160 VDU19,1,4;0;
  170 REM Compass letters
  180 VDU23,228,0,0,0,34,50,42,38,34
  190 VDU23,229,0,0,0,62,32,62,2,62
  200 VDU23,230,0,0,0,62,32,62,32,62
  210 VDU23,231,0,0,0,34,34,42,42,62
  220 REM North > South East
  230 VDU23,232,0,8,28,62,28,28,28,0
  240 VDU23,233,0,14,14,30,56,112,96,0
  250 VDU23,234,0,8,124,126,124,8,0,0
  260 VDU23,235,0,96,112,56,30,14,14,0
  270 REM South > North West
  280 VDU23,236,0,28,28,28,62,28,8,0
  290 VDU23,237,0,6,14,28,120,112,112,0
  300 VDU23,238,0,16,62,126,62,16,0,0
  310 VDU23,239,0,112,112,120,28,14,6,0
  320 REM 0 (coords)
  330 VDU23,224,0,0,60,36,36,60,0,0
  340 DIM S(24),C(24),V$(5),d%&20
  350 V$(0)="Go North"+STRING$(8," ")
  360 V$(1)="Go East"+STRING$(9," ")
  370 V$(2)="Go South"+STRING$(8," ")
  380 V$(3)="Go West"+STRING$(9," ")
  390 V$(4)="Dig for treasure"
  400 V$(5)="Help!"+STRING$(11," ")
  410 FOR I%=0 TO 24:J=RAD(I%*15)
  420 S(I%)=SINJ:C(I%)=COSJ:NEXT
  430 ENDPROC
  440 DEFPROCgame
  450 LOCAL U%:U%=-1:PROCscreen
  460 VDU23,1,0;0;0;0;:PROCmove(0)
  470 REPEAT:PROCinput
  480 PROCaction:UNTIL end:ENDPROC
  490 DEFPROCscreen
  500 GCOL0,129:CLG
  510 PROCcircle(2,640,632,532,320)
  520 FOR I%=0 TO 1
  530 PROCbox(0,172+I%*8,920+I%*4,1112-I
%*8,1000-I%*4)
  540 PROCbox(0,180+I%*8,824+I%*4,648-I%
*8,900-I%*4)
  550 PROCbox(0,688+I%*8,824+I%*4,1096-I
%*8,900-I%*4):NEXT
  560 COLOUR129:COLOUR3
  570 PROCdb(3,1,"Treasure Trail")
  580 PROCdb(3,4,"Days:00")
  590 PROCdb(11,4,"Food:9")
  600 FOR L%=0 TO 10:MOVE 320,476+L%*32
  610 DRAW 960,476+L%*32
  620 MOVE 320+L%*64,476
  630 DRAW 320+L%*64,796:NEXT
  640 PROCbox(0,16,48,1264,144)
  650 PROCbox(0,16,176,1264,272)
  660 PROCbox(0,1136,348,1224,424)
  670 FOR I%=0 TO 4
  680 PROCbox(1,648+I%*8,704+I%*4,700-I%
*8,728-I%*4)
  690 PROCbox(1,456+I%*8,608+I%*4,508-I%
*8,632-I%*4)
  700 PROCbox(1,840+I%*8,512+I%*4,892-I%
*8,536-I%*4):NEXT
  710 PROCcircle(0,144,440,136,136)
  720 PROCcircle(3,144,440,128,128)
  730 GCOL0,0:GCOL0,132
  740 VDU5:MOVE8,460:VDU231
  750 MOVE220,460:VDU230:MOVE112,568
  760 VDU228:MOVE112,348:VDU229
  770 MOVE324,476:VDU224:MOVE264,508
  780 VDU224,4:ENDPROC
  790 DEFPROCbox(C%,X%,Y%,x%,y%)
  800 GCOL0,C%:MOVEX%,Y%:DRAWx%,Y%
  810 DRAWx%,y%:DRAWX%,y%:DRAWX%,Y%
  820 ENDPROC
  830 DEFPROCcircle(C%,X%,Y%,rx%,ry%)
  840 LOCAL T%:GCOL0,C%:MOVE X%,Y%
  850 FOR T%=0 TO 24:MOVE X%,Y%
  860 x%=X%+S(T%)*rx%:y%=Y%+C(T%)*ry%
  870 PLOT85,x%,y%:NEXT:ENDPROC
  880 DEFPROCinput
  890 REPEAT:PROCw(.2):*FX15
```

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```
  900 IF INKEY-58 OR INKEY-86:V%=0:M%=0
  910 IF INKEY-122 OR INKEY-35:V%=1:M%=1
  920 IF INKEY-42 OR INKEY-82:V%=2:M%=2
  930 IF INKEY-26 OR INKEY-34:V%=3:M%=3
  940 IFV%<>U%PROCdb(1,24,V$(V%)):U%=V%
  950 IF INKEY-51:V%=4
  960 IF INKEY-85:V%=5
  970 UNTIL INKEY-74:ENDPROC
  980 DEFPROCdb(X%,Y%,M$):VDU31X%Y%
  990 LOCALA%,L%:X%=d%:Y%=X%DIV256:A%=10
 1000 FOR L%=1 TO LENM$
 1010 ?d%=ASCMID$(M$,L%):CALL&FFF1
 1020 VDU23,254,X%?1,X%?1,X%?2,X%?2,X%?3
,X%?3,X%?4,X%?4
 1030 VDU23,255,X%?5,X%?5,X%?6,X%?6,X%?7
,X%?7,X%?8,X%?8
 1040 VDU254,8,10,255,11:NEXT:ENDPROC
 1050 DEFPROCaction
 1060 IF V%>-1 IF V%<4:PROCmove(2+(FNpoo
l(X%,Y%)=-1)):M%=V%
 1070 IF V%=0:IF Y%<9:Y%=Y%+1:PROCgo
 1080 IF V%=1:IF X%<9:X%=X%+1:PROCgo
 1090 IF V%=2:IF Y%>0:Y%=Y%-1:PROCgo
 1100 IF V%=3:IF X%>0:X%=X%-1:PROCgo
 1110 IF V%>3 IF FNpool(X%,Y%):f=9.5:PRO
Cdet
 1120 IF V%=4:PROCdig:V%=M%
 1130 IF V%=5:PROCclue:V%=M%
 1140 IF da>90 PROCend(2)
 1150 ENDPROC
 1160 DEFPROCgo:PROCmove(0)
 1170 da=da+1:f=f-.5:PROCdet
 1180 IF NOTFNpool(X%,Y%):IF f=0.5 PROCe
nd(1)
 1190 ENDPROC
 1200 DEFPROCw(t):LOCALT%:T%=TIME+t*100
 1210 REPEAT UNTIL TIME>T%:ENDPROC
 1220 DEFPROCclear
 1230 PRINTTAB(1,24)SPC18TAB(1,25)SPC18
 1240 PRINTTAB(1,28)SPC18TAB(1,29)SPC18
 1250 ENDPROC
 1260 DEFPROCmove(C%)
 1270 PROCbox(C%,336+X%*64,486+Y%*32,368
+X%*64,502+Y%*32)
 1280 IF C%=0:SOUND0,-15,6,1:SOUND0,-7,5
,1:SOUND0,-3,4,1
 1290 ENDPROC
 1300 DEFFNpool(X%,Y%)=(X%=2 AND Y%=4) O
R (X%=5 AND Y%=7) OR (X%=8 AND Y%=1)
 1310 DEFPROCdet:LOCAL A%
 1320 IF da<10 A%=9 ELSE A%=8
 1330 PROCdb(A%,4,STR$da)
 1340 PROCdb(16,4,STR$INTf):ENDPROC
 1350 DEFPROCdig:SOUND0,-10,4,1
 1360 SOUND0,-12,5,1:SOUND0,-15,6,1
 1370 IF X%=Tx% AND Y%=Ty% PROCdb(1,28,"
You've found it!"):PROCw(2):PROCend(0):E
NDPROC
 1380 PROCdb(1,28,"You find nothing.")
 1390 di=di+1:IF di>2 PROCend(3)
 1400 PROCw(2):ENDPROC
 1410 DEFPROCclue:LOCAL H%:PROCclear
 1420 IF K%>6 PROCdb(1,28,"No more clues
") ELSE PROCgive
 1430 PROCw(2):PROCclear:ENDPROC
 1440 DEF PROCgive:K%=K%+1
 1450 IF K%AND1 H%=FNcord:ELSE:H%=FNcomp
 1460 IF H%=1:PROCdir ELSE PROCdb(18,19,
"?")
 1470 ENDPROC
 1480 DEFFNcomp
 1490 LOCAL L%,P%,Q%,S%
 1500 L$="":L%=RND(8)-1
 1510 IF L%=7 OR L%<2 L$="north "
 1520 IF L%>2 IF L%<6 L$="south "
 1530 IF L%>0 IF L%<4 L$=L$+"east"
 1540 IF L%>4 IF L%<8 L$=L$+"west"
 1550 PROCdb(1,28,"Show "+L$)
 1560 PROCw(.5):P%=0:Q%=1
 1570 REPEAT:PROCw(.05):*FX15
 1580 IF P%<>Q% PROCp(P%,0):PROCp(Q%,3):
Q%=P%
 1590 IF INKEY-99:P%=P%+1:IF P%=8 P%=0
 1600 UNTILINKEY-74:PROCp(P%,3)
 1610 =FNresult(P%=L%)
 1620 DEFPROCp(L%,C%)
 1630 GCOL0,C%:MOVE148,438
 1640 DRAW148+S(L%*3)*64,438+C(L%*3)*64
 1650 ENDPROC
 1660 DEFPROCdir
 1670 LOCAL D%,x%,y%:x%=Tx%-X%:y%=Ty%-Y%
 1680 IF x%=0:IF y%=0:PROCdb(1,28,"You a
re on it!"):PROCdb(18,19,"!"):ENDPROC
 1690 a=DEGACS(x%/SQR(x%*x%+y%*y%))
 1700 IF y%>0 a=360-a
 1710 D%=((a+90)MOD360)DIV45
 1720 PROCdb(18,19,CHR$(232+D%))
 1730 ENDPROC
 1740 DEF FNresult(A%)
 1750 LOCAL H%,S%,t$:PROCw(2):PROCclear
 1760 IF A% t$="Well done!":H%=1:S%=100:
ELSE:t$="Hard Luck!":H%=0:S%=8
 1770 PROCdb(1,28,t$):SOUND1,-9,S%,1:=H%
 1780 DEFFNcord:PROCclear
 1790 PROCdb(1,28,"Where are you ?")
 1800 PROCdb(8,24,"( , )")
 1810 LOCAL J%,N%,R%
 1820 REPEAT J%=9+R%*2
 1830 REPEAT PROCdb(J%,24,"*")
 1840 PROCdb(J%,24," "):N%=INKEY0-48
 1850 UNTIL N%>-1 AND N%<10
 1860 IF R%=0 Gx%=N% ELSE Gy%=N%
 1870 PROCdb(9+R%*2,24,CHR$(48+N%))
 1880 R%=R%+1:UNTIL R%>1
 1890 =FNresult((Gx%=X%)AND(Gy%=Y%))
 1900 DEFPROCend(T%):LOCAL P$:end=TRUE
 1910 IF T%=0 PROCdone:ENDPROC
 1920 IF T%=1 P$="food."
 1930 IF T%=2 P$="days."
 1940 IF T%=3 P$="digs."
 1950 PROCclear:SOUND1,-12,8,1
 1960 PROCdb(1,24,"You failed to find")
 1970 PROCdb(3,28,"the treasure.")
 1980 PROCw(2):PROCclear:SOUND1,-12,8,1
 1990 PROCdb(1,24,"You did not have")
 2000 PROCdb(3,28,"enough "+P$)
 2010 PROCw(2):PROCclear:ENDPROC
 2020 DEFPROCdone:VDU19,1,1;0;
 2030 GCOL0,128:CLG:GCOL0,1
 2040 MOVE96,96:MOVE1184,96
 2050 PLOT85,96,848:PLOT85,1184,848
 2060 GCOL0,0:MOVE128,544:MOVE1152,544
 2070 PLOT85,128,816:PLOT85,1152,816
 2080 GCOL0,2
 2090 FOR I%=112 TO 1136 STEP 128
 2100 MOVE I%,160:MOVE I%+16,160
 2110 PLOT85,I%,512:PLOT85,I%+16,512
 2120 NEXT
 2130 PROCcircle(0,640,448,16,48)
 2140 PROCcircle(0,640,432,32,32)
 2150 PROCw(2):GCOL0,2
 2160 FOR I%=256 TO 1024 STEP128
 2170 J%=I%-(640-I%)DIV2
 2180 MOVEI%,544:MOVEI%+16,544
 2190 PLOT85,J%,960:PLOT85,J%+16,960
 2200 NEXT:PROCw(2):ENDPROC
 2210 DEFFNanother:CLS:LOCAL A%
 2220 PROCdb(1,10,"Another game ?")
 2230 REPEAT A%=INSTR("YyNn",GET$)
 2240 UNTIL A%>0:=A%<3
```

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```
 10 =    0 0 | 390 = 293F 5 | 770 = 87CD 7 | 1150 = ED0F 2 | 1530 = C188 3 | 1910 = 34BF 8
 20 =    0 0 | 400 = A428 5 | 780 = D7F9 C | 1160 = F088 E | 1540 = 3AD5 D | 1920 = 6289 5
 30 =    0 0 | 410 = A4E0 F | 790 = 7AF3 8 | 1170 = 4377 4 | 1550 = A678 3 | 1930 = D933 6
 40 = BC2B B | 420 = B66C C | 800 = F3FD F | 1180 = AB89 5 | 1560 = 93DD 8 | 1940 = 6196 1
 50 = EF84 7 | 430 = ED0F D | 810 = 3198 F | 1190 = ED0F B | 1570 = B230 7 | 1950 = D250 9
 60 =  4E1 9 | 440 = 74F3 5 | 820 = ED0F 4 | 1200 = 5436 C | 1580 = F8A0 F | 1960 = 41E6 1
 70 = 1E64 7 | 450 = E98D 4 | 830 = 91AB 9 | 1210 = B6C9 7 | 1590 = 2C2C D | 1970 = C661 5
 80 = D15C 8 | 460 = 12CB 1 | 840 = 4CEC 8 | 1220 = 4623 F | 1600 = 1D81 5 | 1980 = 35C4 3
 90 = 2906 F | 470 = EE93 4 | 850 = 167E 6 | 1230 = F13D A | 1610 = 1B10 2 | 1990 = 2CD1 E
100 = FD2E 9 | 480 = B86B 2 | 860 = 3B5D 7 | 1240 = 6CD8 1 | 1620 = 2F13 9 | 2000 = 3AFB 6
110 = 344C F | 490 = F5B9 0 | 870 = 344F 2 | 1250 = ED0F 9 | 1630 = 54A9 E | 2010 =  EC6 B
120 = 63AE 0 | 500 = 2BF7 D | 880 = EA07 F | 1260 = F27C 7 | 1640 = 8460 4 | 2020 = 90B5 0
130 = 8663 3 | 510 = 40F0 6 | 890 = 8388 3 | 1270 = 7F00 1 | 1650 = ED0F F | 2030 = 2497 A
140 = BA97 0 | 520 = 2C3D 4 | 900 = 1B5B A | 1280 = 9629 7 | 1660 = CC71 3 | 2040 =   35 F
150 = B6C8 9 | 530 = 1736 0 | 910 =  D86 8 | 1290 = ED0F F | 1670 = 5484 A | 2050 = F327 D
160 = 7DA9 8 | 540 = 4DC3 6 | 920 = 3E2D B | 1300 = BCBF A | 1680 = 6842 D | 2060 = 388C 2
170 =    0 8 | 550 = C2BD 7 | 930 = 90C8 D | 1310 = 3925 8 | 1690 = 22C0 7 | 2070 = 24FF E
180 = 6B3F E | 560 = 5207 5 | 940 = CB4E F | 1320 = 9154 2 | 1700 = 521C 8 | 2080 = 334C 3
190 = B833 2 | 570 = 2BC0 0 | 950 = 22B3 7 | 1330 = 2E84 5 | 1710 = 8633 D | 2090 = C9EC 0
200 =  E78 4 | 580 = 9832 5 | 960 = DE39 0 | 1340 = 84C1 2 | 1720 = FE0F E | 2100 = 8443 2
210 = F1C2 5 | 590 = 642B C | 970 = 53E8 8 | 1350 = 9D77 9 | 1730 = ED0F 5 | 2110 = 38B7 6
220 =    0 5 | 600 = 4890 3 | 980 = E0C2 5 | 1360 = 30F4 0 | 1740 = B109 8 | 2120 = 2C83 3
230 = DBCB 9 | 610 =  520 D | 990 = 9F12 D | 1370 = 5AA9 8 | 1750 = 4443 E | 2130 = 1078 F
240 = 1A8B E | 620 = 9C36 1 | 1000 = 108A 5 | 1380 = C0F6 E | 1760 = 4C04 2 | 2140 = 58B2 6
250 = 23C0 C | 630 = 9263 E | 1010 = 3F8A 1 | 1390 = 788A F | 1770 = 24D0 6 | 2150 = A775 2
260 = 1FC5 F | 640 =  2FD 5 | 1020 = C94C C | 1400 = 16B8 8 | 1780 = 589B D | 2160 = BD91 3
270 =    0 F | 650 = A1E5 8 | 1030 = 21C9 7 | 1410 = 6610 8 | 1790 = A0D6 2 | 2170 = 1450 3
280 = DA67 5 | 660 = 7187 6 | 1040 = D7F0 3 | 1420 = 9F73 C | 1800 =  D7D 9 | 2180 = 830C D
290 = 77D9 0 | 670 = 7C98 2 | 1050 = D94E 6 | 1430 =  EC6 7 | 1810 = 687E 6 | 2190 = 664C 3
300 = 10D4 D | 680 = 17AC A | 1060 = A894 D | 1440 = 160E D | 1820 = 3B57 5 | 2200 = D8BC 1
310 =  A42 6 | 690 = 5B07 C | 1070 = 30F2 4 | 1450 = 528F 9 | 1830 = CB73 3 | 2210 = AEED E
320 =    0 6 | 700 = C03F 1 | 1080 = 32FF 6 | 1460 = D065 2 | 1840 = AB24 5 | 2220 = B232 9
330 = 8B2B 0 | 710 = AD66 0 | 1090 = 6E8E A | 1470 = ED0F 9 | 1850 = 9EEA D | 2230 = AEE6 A
340 = 81F9 F | 720 = 81E9 A | 1100 = 6C83 A | 1480 = 3F20 8 | 1860 = 6757 5 | 2240 = 6A81 B
350 = DEA7 8 | 730 =  390 4 | 1110 = 9376 8 | 1490 = 7993 6 | 1870 = F5F5 4
360 = 61E7 E | 740 = 7D93 3 | 1120 = 7DCA D | 1500 = 6FFD F | 1880 = 5ABE D
370 = C679 2 | 750 = 66F7 D | 1130 = 8E84 8 | 1510 = 13FE E | 1890 = 7AFD 4
380 = 9B27 8 | 760 = EDA6 B | 1140 = 80FB 8 | 1520 = 2F80 A | 1900 = 766E 8
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Archimedes 440 Basic	£2,529(a)
Acorn Mono Monitor*	£60(a)
Acorn Colour Monitor*	£220(a)
Philips CM8833 Col Monitor*	£210(a)
PC Emulator Software*	£60(b)

**Prices applicable only when purchased with the computer*

ADD-ONS

0.5Mb Ram upgrade kit (for 305)	£144(b)
2nd Floppy Drive (305, 310)	£118(b)
Backplane for 2 podules	£37(c)
I/O Podule	£80(c)
20Mb Hard disc + podule	£469(a)
Acorn ROM Podule	£55(c)
CC ROM Podule	£45(c)
Midi Addon to I/O	£37(c)
Midi Expansion Card	£66(c)
Econet Network Module	£43(d)
Archimedes Printer Lead	£7(d)
Archimedes Colour Monitor Lead	£7.50(d)
IEEE Interface Podule	£283(b)

(Full implementation of IEEE 488 & 488A) Spec on request

Armadillo Sound Sampler	£105(b)
Fourier Transform Software	£40(d)
ARC/BBC Serial Link	£25(d)
ARC External Drive Adaptor	£30(d)
External 5.25 Drive	£104(b)

BOOKS: *(no VAT)*

Arc. Ref Manual	£29(b)
ARM Assy Lang Prog	£12(d)

SOFTWARE:

PC Emulator Version 1.20	£99(d)

(includes MS-DOS 3.2)

LANGUAGES:

ANSI C	£95(c)	ISO PASCAL	£95(c)
Prolog X	£181(b)	FORTRAN 77	£95(c)
LISP	£181(b)	COMAL	POA

PROGRAMMERS TOOLS:

TWIN *Editor*	£29(d)
Toolkit Plus Module	£41(d)
Software Dev T/Box	POA
Software Dev Debug T/box	POA

WORDPROCESSORS

First Word Plus	£79(d)	View SKM31 (e)	£47(d)
Graphics Writer	£27(d)	Interword (e)	£35(d)
PipeDream	£99(d)	Wordwise +	£20(d)

SPREADSHEETS

Logistix	£95(d)

(Includes spreadsheet/database/timesheets/graphics)

Matrix 3D	£159(c)

(3 Dimensional s/sheet with 19k col, 10k row & 100 pages)

Sigmasheet	£59(d)	Viewsheet SKM7 (e)	£47(d)
Intersheet (e)	£35(d)		

GAMES:

Zarch	£17(d)	Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.

Please check on availability of some of the above packages

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea)	£54(d)

Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger

Special Offer

FREE £115 inc vat VOUCHER

with every Archimedes model 310 and 440 purchased from us.
The voucher can be redeemed against any future purchase from us (inc Arc monitor, PC Emulator (at £60), discs, cables, paper etc.)
Additionally we will offer discounts upto 10% on Archimedes software and 5% on Archimedes hardware stocked by us.

GRAPHICS/ART/CARD

Artisan	£30(d)	GammaPlot	£30(d)
Artisan Support	£17(d)	System GammaPlus	£59(d)
Autosketch	£69(d)	Interchart (e)	£25(d)
Presenter	£24(d)		

(Allows importing of text into First Word+)

DATABASES

Deltabase	£26(d)	ViewstoreSKM07(e)	£47(d)
System Delta+	£57(c)	Alphabase	£39(d)
Prog Ref Guide	£26(c)		

Support modules for System Delta Plus each	£35(d)
CC MEGA 3 (incl. Interword/sheet/chart) (e)	£82(c)

FILE STORE

Acorn's new file server system

Filestore E01	£825(a)
Filestore E02	£699(a)

Full details on request

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.

Full spec on request £299(b)

technoCAD

To be launched soon

The most comprehensive CAD system for the Master. Host of innovative features for creating complex drawings, pcb layouts, sketches etc. Virtually no restrictions on drawing sizes. On screen scaling for plotters, variety of screen dumps for compatible printers.

FREE

evaluation disc available to any educational establishment. A handling charge of £3 for others. The disc contains operating instructions and will perform as release version except for file functions.

MASTER SERIES

AMB15 Master 128K	£356(a)

Includes *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.

ADC06 Turbo 65C102 Module	£115(b)
ADC08 512 processor includes MS-DOS and GEM Suite	£99(b)

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 ROM Cart	£7.50(d)	TRC4 4ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£21(d)	Master Dust Cover	£4.75(d)

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface (for B, B+ Master)	£265(b)
Universal CoProc Adapter	£49(b)
BBC Domesday System	£3,750(2×a)

Send for detailed list of DOS software for 512

MASTER SUMMER SPECIAL
Master AMB15+512 Co-Processor for only
£420(a)
(Allow £5 extra if you would like us to fit the card for you)
512 upgrade includes 80186 processor with 512K RAM, DOS+, GEM Suite (Desk Top, Paint & Write) and Mouse
This offer valid while stocks last.
Ask for our list of DOS software compatible with 512.

MASTER COMPACT

All Compact systems come complete with 128K of RAM, 640K 3.5" double sided drive and educational software. Additionally we include our Education/Fun software bundle to the package.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12" Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14" Med Res Col Monitor	£475 (2xa)
Compact 2nd Drive Kit	£90(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter (upgrades Compact to almost Master level)	£35(c)
External Drive adapter Cable	£9(d)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£49(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25, 27128-25 (12.5V Vpp), 27128-25 (21.0V Vpp), 6264LP-15, 27256, 27512

All prices on application

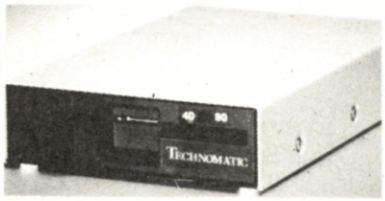
RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+ (10 Roms)	£31(c)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

TECHNOMATIC DISC DRIVES



TS 400

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

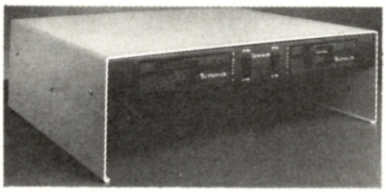
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.



PD 800P

5.25" Single Drives 40/80 switchable:	
TS400 400K/640K	**£90(b)**
PS400 400K/640K with integral mains power supply	**£101(b)**
5.25" Dual Drives 40/80 switchable:	
TD800 800K/1280K	**£170(a)**
PD800 800K/1280K with integral mains power supply	**£190(a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£209(a)**
3.5" 80T DS Drives:	
TS351 single 400K/640K	**£69(b)**
PS351 single 400K/640K with integral mains power supply	**£85(b)**
TD352 Dual 800K/1280K	**£126(b)**
PD352 Dual 800K/1280K with integral mains power supply	**£149(b)**
Combo Drives (5.25" & 3.5" drives)	
PD853 with integral psu	**£175(a)**
PD853P with integral psu	**£195(a)**
DISC DRIVE MULTIPLEXER	
see page 5 of this ad for details	
For Master, B, B+ and any DFS/ADFS	
TDM2 Two computers/one drive unit	**£65(b)**
TDM4 Four computers/one drive unit	**£115(b)**

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£419(a)**
P30HD 30Mb Winchester Drive	**£435(a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£669(a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£609(a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1179(a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£546(a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£21(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer **£28**

WINCHESTER Drive Multiplexer

These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	**£99 (b)**
TWM4 for four Computers.	**£149 (b)**

NEW **Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master.** **£435(a)**

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD	**£6.75(d)**
745 40T DS DD	**£9.75(d)**
746 80T SS DD	**£12.00(d)**
747 80T DS DD	**£12.75(d)**

3.5" Discs in packs of 10

80T SS DD	**£13.50(d)**
80T DS DD	**£15.00(d)**

(Add £1 for library case packing)

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box.	**£25(b)**
50 5.25" 80 T double sided discs with sleeves in lockable box.	**£32(b)**
50 3.5" 80T double sided discs with sleeves in lockable box.	**£60(b)**
FLOPPICLENE DRIVE HEAD CLEANING KIT	
5.25" Kit with 20 disposable discs	**£14.00(d)**
3.5" Kit with 20 disposable discs	**£14.75(d)**
DISC STORAGE BOXES	
DB340 Lockable 40 × 3.5"	**£8.50(c)**
DB550 Lockable 50 × 5.25"	**£6.50(c)**
DB570 Lockable 70 × 5.25"	**£8.50(c)**
DB5100 Lockable 100 × 5.25"	**£10.50(c)**

All prices ex VAT and subject to change without notice.

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON

LX800	**£179(a)**	**LQ500**	**£279(a)**
FX800	**£309(a)**	**LQ850**	**£419(a)**
FX1000	**£405(a)**	**LQ1050**	**£589(a)**
EX800	**£409(a)**	**LQ2500+**	**£849(a)**
EX1000	**£549(a)**		

GQ3500 Laser Printer £1249(a)

Taxan KP815	**£159(a)**	**Taxan KP915**	**£275(a)**

Star LC10 **£175(a)**
Star LC10 Colour **£229(a)**

NATIONAL PANASONIC
KXP1081* **£145(a)** **KXP1082*** **£172(a)**
(*includes Wysiwyg ROM + Master Lead)

KXP3131 with 38K buffer **£245(a)**
Canon PW1080 **£179(a)**
Canon Laser LBP8-II **£1595(a)**
Brother HR20 Daisy Wheel **£349(a)**
Juki 6100 Daisy Wheel **£295(a)**
Integrex Colour Inkjet **£515(a)**

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL **£499(a)**
Plotmate A4S **£379(a)**
Plotmate A3M **£549(a)**
Roland 880 A3 Flat bed 8 col **£599(a)**
Variety of Plotter pens and accessories in stock.
Larger Plotters available. Please enquire.

EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 × 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A).
Introductory price incl. master lead **£279(a)**

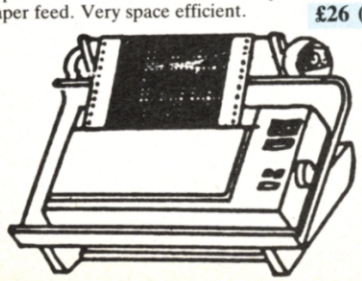
EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

★ 180 cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.
★ 3K input buffer with character downloading facility
★ Fully compatible with BBC & IBM graphics
★ Centronics interface as standard
★ Price including BBC master lead **£179(a)**

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



PRINTER BUFFERS SHARER & CONVERTERS

TSB 256 Auto Sharer/Buffer
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies.
Full spec on request. **£169(a)**

Smart Printer Buffers
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port
PP256 256K Parallel buffer **£169(b)**
SS256 256K Serial buffer **£189(b)**

Parallel Multi-Spoolers
Allows connecting 2 printers to 2 or 4 computers
Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR
MS422 4computers/2printers 512K buffer **£299(b)**
MS223 2computers/2 printers 512K butter **£199(b)**

Auto switching Printer Sharers
Allows 2, 4 or 8 computers to share 1 printer
Auto Self Test, READY and BUSY indicators

	Parallel	Serial
2 input/1 output	£49	£49(c)
4 input/1 output	£59	£69(c)
8 input/1 output	£85	£85(c)

All units fitted with 25D Connectors

Serial/Parallel/Serial Converters
Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols
C-PS Parallel/Serial converter **£35(c)**
C-SP Serial Parallel converter **£35(c)**
Add £49 to above prices for units with 64K butter

Manual Printer Sharers:

(All lines are switched).	Parallel	Serial
2 computers to one printer	£25(c)	£25(c)
3 computers to one printer	£39(c)	£39(c)
4 computers to one printer	£45(c)	£45(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels
Plain fanfold paper with microperforation:
2000 sheets 9½ × 11" **£12(£3.50)**
2000 sheets 14½ × 11" **£18.50(£4.50)**
1500 sheets A4 90gsm **£18.00(£4.00)**

Labels/1000
Single Row 3½ × 17/16 **£5(d)**
Triple Row 2 7/16 × 7/16 **£5(d)**
OHP Transparencies A4 **£55(b)**

PRINTER LEADS
BBC/Master Parallel Lead (1.2M) **£5(d)**
BBC/Master Parallel Lead (2.0M) **£7(d)**
Compact Parallel Lead (1.2M) **£7(d)**
Archimides Parallel Lead (2M) **£7(d)**

MODEMS

MIRACLE WS4000 V21/23 **£129(b)**
MIRACLE WS3000 V21/23 **£244(b)**
MIRACLE WS3000 V22 **£379(b)**
MIRACLE WS3000 V22 bis **£495(b)**
Pace Linnet **£139(b)**
(All modems are BABT approved)
BBC Data Cable for WS3000/4000 **£10(d)**
MIRACLE WS2000V21/23 & BELL stds **£92(c)**

MONITORS

All Monitors supplied with a suitable lead.

12", 14" and 20" MONITORS

Microvitec 1431
Std Res, 14" **£179(a)**
Microvitec 1431AP
Std Res + PAL/Aud, 14" **£199(a)**
Microvitec 1451
Med Res, 14" **£225(a)**
Microvitec 1451AP
Med Res + PAL/Aud, 14" **£255(a)**
Microvitec 1441
Hi Res, 14" **£359(a)**
Philips 8833 14" RGB
Med Res, 14", high contract screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers. **£219(a)**
Sanyo CRT 70
14" High Resolution Colour Monitor **£149(a)**
Compatible with Master, B, Compact, and PC compatibles
Microvitec 2030CS
20" Standard Resolution RGB/ Comp Video **£380(a)**
Microvitec 2040CS
20" High Resolution RGB/Comp Video **£675(a)**
TAXAN SUPER VISION 620
12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**
TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**
TAXAN 770+
MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£495(a)**
NEC MultiSync II 14"
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£489(a)**

MONOCHROME MONITORS

PHILIPS 7552 NEW!
14" green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Reverse video switch, separate brilliance and contrast controls **£85(a)**
PHILIPS BM 7502
Hi Res green screen **£72(a)**
PHILIPS BM 7522
Hi Res amber screen **£79(a)**
Tilt & Swivel Stand for Philips Mono **£6(c)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors) **£17(c)**
Monitor Stand Models B & B+ **£10(c)**
Monitor Stand Master **£13(c)**
Double Tier Stand Models B, B+ or Master **£24(b)**
Taxan RGB Lead **£7(d)**
Microvitec Lead **£4(d)**
Monochrome BNC/Phono Lead **£4(d)**
Copy Holder Self Supporting A4 **£15(c)**

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	**£49 (d)**
TM Version plus Tracker Ball	**£94 (d)**
TM Version plus Mouse	**£79 (d)**
Plotter Driver Generator	**£15 (d)**
If purchased with Novacad	**£12 (d)**
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	**£59 (d)**
STOP PRESS (Pagemaker)	**£32 (d)**
EXTRA/EXTRA (utility for the Pagemaker)	**£19(d)**
MAX	**£17 (d)**
STAND ALONE MOUSE	**£34 (c)**
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	**£59 (c)**
RB2 Tracker Ball with Cursor Control Rom (for Master only)	**£59 (c)**
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	**£47 (c)**
Cursor Control Rom for Master	**£12.50 (d)**
MIRRORSOFT FLEET STREET EDITOR	**£35 (d)**

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program **£29(d)**

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	**£36 (d)**
STARdataBASE	**£39 (d)**
MASTERFILE II	**£17 (d)**
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	**£69 (b)**
INTERBASE	**£49 (d)**

WORD PROCESSORS

ACORN VIEW PROFESSIONAL (BBC)	**£69 (c)**
VIEW 2.1	**£35 (d)**
VIEW 3.0	**£45 (c)**
Double View Rom Version	**£42 (d)**
Double View Disc Version (for Master & Compact)	**£33 (d)**
VIEW INDEX	**£12 (d)**
VIEW PRINTER DRIVER GENERATOR	**£8 (d)**
VIEWSPELL	**£29 (d)**
DOT PRINT PLUS	**£28 (d)**
WORDWISE	**£24 (d)**
WORDWISE PLUS	**£38 (d)**
WYSIWYG PLUS	**£21 (d)**
SPELLMASTER	**£42 (d)**
INTERWORD	**£36 (d)**
WORDEASE	**£24 (d)**
SPELLCHECK III	**£31 (d)**
EDWORD II	**£43 (c)**

SPREADSHEETS

VIEWSHEET	**£36 (d)**
WINDOMATIC (A Viewsheet Utility)	**£15 (d)**
VIEWPLOT	**£22 (d)**
INTERSHEET	**£37 (d)**
INTERCHART	**£25 (d)**
ULTRACALC	**£26 (d)**
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	**£14 (d)**
For Master 80T	**£16 (d)**
For Compact	**£19 (d)**
MINI OFFICE II ROM Version	
For Master, Compact, B+ & B	**£43 (c)**
MEGA 3Rom	**£76 (b)**

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

LANGUAGES

META ASSEMBLER	**£145 (b)**
TEAM DISASSEMBLER	**£145 (b)**
MACROM	**£33 (d)**
ACORNSOFT 'C'	**£40 (c)**
ACORN MICRO PROLOG	**£62 (d)**
ISO-PASCAL	**£51 (c)**
ISO-PASCAL STAND ALONE GENERATOR	**£30 (d)**
OXFORD PASCAL (40 or 80T) Specify B or B+	**£36 (d)**
OXFORD PASCAL for Master	**£52 (d)**
ACORN LOGO	**£46 (c)**
LOGOTRON LOGO	**£55 (c)**
BBC PUBLICATIONS OPEN LOGO	**£59 (c)**
ACORN LISP ROM	**£39 (d)**
ACORN FORTH ROM	**£39 (d)**
ACORN COMAL ROM	**£39 (d)**
Advanced BASIC Disc (for B, B+ & Master + 6502 2nd Processor)	**£26 (d)**
MICROTEXT	**£52 (c)**
MICROTEXT PLUS	**£229 (b)**

COMMUNICATIONS

TERMULATOR	**£25 (d)**
COMMSTAR II	**£28 (d)**
MAYA Comms Package NEW! See next page for details	**£49 (d)**
MODEM MASTER	**£11 (d)**
COMMAND	**£34 (d)**
MASTER TERMULATOR	**£34.75 (d)**

UTILITIES

ACORN ADFS ROM	**£26 (d)**
ACORN BASIC EDITOR	**£24 (d)**
MONITOR (BBC Pub)	**£19 (d)**
SLEUTH	**£23 (d)**
TOOLKIT PLUS	**£31 (d)**
TOOLBOX 2 (BBC Pub) Manual	**£9.50 (d)**
Cassette	**£9 (d)**
ACORN GXR GRAPHICS ROM specify B or B+	**£24(d)**
PRINTMASTER	**£24 (d)**
PRINTWISE	**£24 (d)**
DUMPMASTER	**£26 (d)**
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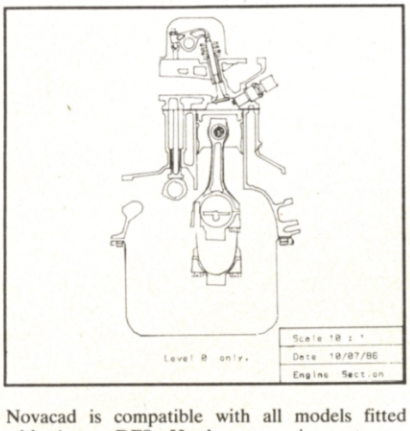

Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

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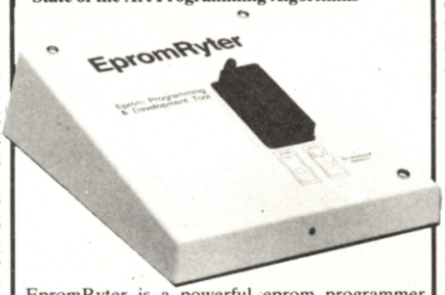

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THE BEEB BODY BUILDING COURSE

A board for all reasons

In the first part of an experimenters' interface board project, Mike Cook introduces the principles involved

IN the dim and distant past, I agreed with the editor of a then unpublished magazine that I would write him four articles about adding extra parts to the BBC Micro. *The Micro User* was launched – and here I am at article 60 and to celebrate I am going to look at a bigger project than usual. Not that it will be complicated, but there will be so much to do with it that it will take several articles to cover its potential.

Many schools, colleges and individuals are taking an interest in micro control technology and most of my articles have covered some aspect of the subject. However our new project will attempt to include most areas of control by producing an experimenters' interface board.

I intend to cram as many devices as possible on to one board to enable many different experiments to be undertaken. The board will be totally re-usable and will be supplied in kit form or ready assembled. The latter will find favour with those of you who are not quite sure of your construction ability.

Finally, for the dedicated enthusiast, the printed circuit board will be available separately to allow you to add the components as time and pocket permit.

No project is ever complete without software, and again I want to break with tradition slightly. All the software so far in this series has been written either in Basic or machine code. There are better languages for control applications and to this end I will produce the software in the traditional Basic/machine code mix and also the equivalent routines written in Forth.

'Forth is a language ideally suited for control, as it is extensible'

This is a language ideally suited for control, as it is extensible – code written becomes part of the language itself. I shall be using the Acorn version of Forth which, despite not being the best implementation I have seen, will allow easy translation to other versions. So you will have an opportunity to look at a task written in two different languages – the most painless way to learn Forth!

In this first part I want to outline both the board and the language, then next month I will look at the detailed circuit of the board, its construction and its testing. Finally we'll go on to look at the experiments we can conduct with it.

One of the major factors in designing this project was to cram in as much usability as possible at a minimum cost, so I decided to connect the board to the user VIA rather than the 1MHz bus. Interfaces that use the bus are, by necessity, that bit more expensive.

However I wanted more than the signal lines provided by the user port, so the board uses both this and the printer port. The latter is buffered inside the micro and so can only be used as an output, while the user port can be used as both input and output. Therefore most of the output devices will connect to the printer port and the

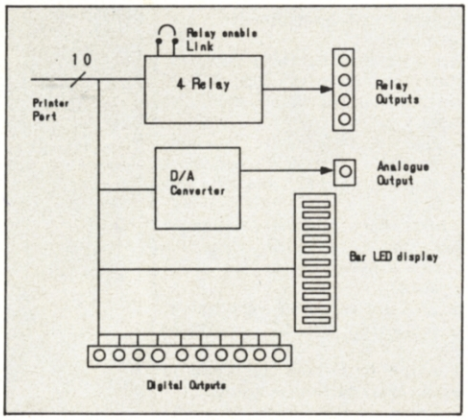

Figure I: The output side of the board

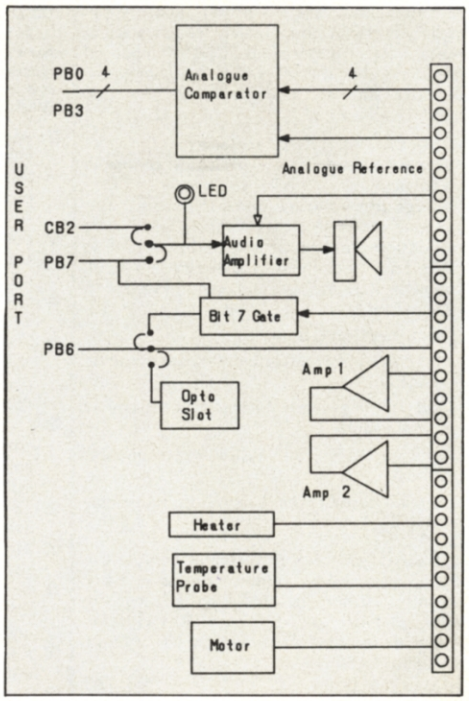

Figure II: The user port connections to the board

inputs to the user port.

The hardware itself is chosen so that not only is it interesting to control in its own right but also interacts with the other pieces on the board. In addition, you can control external devices.

Figure I is a block diagram of the output section – the part that is connected to the printer port. First the signals are brought out to screw connectors to allow connection to any device. On the way they are also used to drive an LED bar display so you can monitor the logic state of each output.

The outputs are also fed to a digital to analogue converter so we can generate sound waveforms and construct an analogue to digital converter.

Finally four of the lines drive miniature relays, and as it might not always be convenient to have these connected, there is a link that can be broken when you want to disable them. They are double-pole change-over capable of switching one amp and can be used for controlling motors and lamps. Four are sufficient to control a buggy.

Figure II is a block diagram of the rest of the board which is the part connected to the user port. Here we have a more dedicated allocation of devices to interface lines. The first 4 bits – PB0 to PB3 – are connected to an analogue comparator which allows them to be used as simple digital inputs with signals that do not conform to the standard logic levels, as well as those that do. In addition it allows us to compare the level of two analogue voltages which, as we shall see later, allows us to construct several different types of analogue to digital converter.

There is an amplifier and loudspeaker which we can drive from an external signal or from one of the lines CB2 or PB7. With them we can look at many different ways of generating audio signals. An optical slot switch and photo-detector will allow us to perform sensing experiments and using the gated input from bit 6 we can measure frequency.

Finally some devices are not connected to any line, and they can be wired up via the screw terminals when required. We have a heater element and temperature sensor, along with an electric motor fitted with a fan. With them we can construct feedback control systems to regulate motor speed and temperature. Finally there are two amplifiers for general purpose use in boosting signal levels.

● *Next month we will be looking at the board's detailed circuit diagram and there will be an order form if you wish to buy one.*

AN OUTLINE OF FORTH

Forth works by defining words, which are similar to procedures in Basic. A word normally consists of a few words that have been predefined as part of the language. However once you have defined your new word you can use it in the definition of others.

In this way you build up a collection of words until the whole program is just represented by a single one. To execute a word, you simply type it on the keyboard. This means that it is simple to debug a program as you go, by testing each word as you define it. In this way you build up a set of words in the area of application you're interested in – control, in this case.

Forth is the only language I have used that allows the writing of non-trivial programs that work first time. You spend a lot more time thinking about what you are trying to do than clattering at a keyboard unsure of what you are doing.

The one thing that puts beginners to Forth off it is the way it handles the parameters to words – procedures. It uses a stack notation, and I must admit that I did not like this aspect of the language at first. However it is an extremely elegant way of handling numbers and one that you will soon appreciate as you become more proficient in code.

In stack notation, numbers are placed on a push down stack and all operations work on that. For example, take addition. Conventionally we may write:

```
5 + 4
```

If you scan that from left to right it says take the number five and perform an addition operation – but to what? We can't do the operation until we read the next number which is four. So what we need to do is to suspend the operation until all the numbers have been defined – a relatively simple task for us, but a messy and wasteful one for the micro.

With stack notation, operators are executed when they are encountered on parameters already on the stack, so the same expression in Forth would be written:

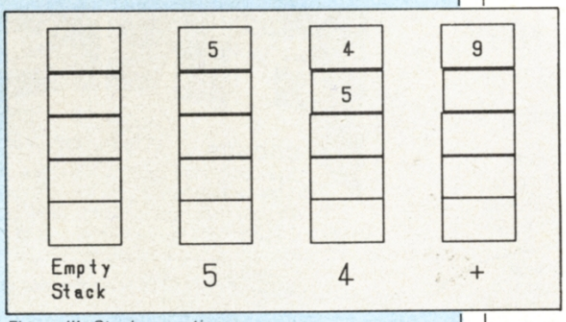

Figure III: Stack operation

```
5 4 +
```

Scan that from left to right and you will see it is in a much more sensible order. Take the number five, put it on a stack, take the number four, put it on the stack and add. Add what? The top two numbers on the stack. These are removed, added and the answer is placed back on the stack.

This operation is shown graphically in Figure III. You see there is no suspension of operation so the micro works quicker and more efficiently with less memory requirements. This allows Forth to run very quickly compared to a conventional high level language and speeds approaching that of machine code are not uncommon.

The Acorn Forth rom is available at a specially reduced price to readers of *The Micro User*. See the offer on Page 112 for full details.

Dave's been down-under!

Unfortunately, they sent him back. His father did all he could, but to no avail. Apparently David was beating the Aussies at "Hopper" (as well as cricket) and they didn't like it. Anyway, he's back, so if you come to see our full range of BBC software and hardware, disc drives, printers, monitors, cables etc, and you hear an Australian accent, it will only be David showing off. Actually, he sounds better than he used to!

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A word from an editor

Steve Turnbull tests and compares two text editors

IN the past few weeks *The Micro User* office has been deluged by word processors and text editors for the Archimedes. While choice of word processing software is a matter of preference selecting the right one for you is always difficult. This review covers two text editors – Twin and Archi-Text – which you would use for writing programs, not novels.

So, what distinguishes a text editor from a word processor? Primarily, output formatting. The latter gives you word wrap, control of print styles, indents, margins, centring of lines and so on. While useful for producing documents these things – particularly word wrap – are a liability when programming.

In addition, text editors always save files as pure Ascii, unlike most word processors which distort text into convoluted formats. But what a text editor must do is facilitate entering and correction of listings.

Product: Twin
Price: £29+vat
Supplier: Acorn Computer Ltd., Fulbourn Rd., Cherry Hinton, Cambridge CB1 4JN.
Tel: 0223 214411

TWIN comes in a large plastic box/folder containing the 3.5in disc, 64 page manual and a function key strip with six rows of options.

The software is designed to interface smoothly with any other interpreted language like Basic or compiler such as C. The name Twin covers several aspects of its operation: It can have two screen windows, one of which can have a task running in it. This means you can actually be running a program in one window and edit a copy in another.

Each window opens on to a buffer that all the output from a task and input from the keyboard go into. Since you can view different parts of it – just like any word processor – any text that has scrolled off the screen has not been lost, you can go back and look at it.

The concept being exploited here is that you write and edit your program in one window and use the copy facility to load it into the task in the other to run it. If any errors appear you can edit and run it again without the need to switch between applications.

Although this seems useful, I'm not sure how good it really is. For a start the majority of applications on the Archimedes will be graphical – Twin filters all screen output and any control codes just get converted to inverse characters. For example, the Basic command:

```
PRINTTAB(5,10)"Hello"
```

produces:

```
.E.Hello
```

For compiling C, Fortran, Pascal and so on it may speed up the debugging of syntax errors – all those errors which would be flagged during the compilation process itself. But again, it would be pretty useless for checking the application itself.

If a text editor can speed up the actual coding of a program it can't be bad and to aid this Twin has structures: All languages have particular groupings of control structures: IF...THEN...ELSE, REPEAT...UNTIL and so on. Twin has a facility to allow you to enter something like:

```
CASE OF
 WHEN :
 OTHERWISE
ENDCASE
```

with just two key presses – you can then fill in the details. Not only that, you can define your own.

The search and replace facilities are quite extensive, and are derived from the Edit package available on the Master – but it's a lot easier to use.

When one of the search options is requested the two top lines of the six level function key strip come into play. These give you options like selecting with or without case sensitivity and including control characters and ones over 126 Ascii. Selection from restricted sets of characters is possible, as are strings of indeterminate length.

There are clever facilities for loading and saving files via complex directory paths if you need them – for instance using a C compiler on a multi-user network.

The biggest surprise to me is that the product is completely keyboard-driven – no mouse use at all. I know some people will consider this a mercy, but when compared with ArchiText it's a failing.

Product: ArchiText
Price: £19
Supplier: Hopesoft, Hope Cottage, Winterbourne, Newbury, Berkshire RG16 8BB.
Tel: 0635 248472

THIS package has been produced by a new software house using Acorn's C compiler. The disc comes with an 18 page photocopied manual plus a two-level function key strip with several empty

Turn to Page 86 ▶

Points for

- **Good edit facilities**
- **Concurrent processing**

Against

- **Complex operation**
- **No display control**

◀ From Page 85

spaces. The product is designed to replace Twin, so that from Basic you can enter the TWIN command and get ArchiText instead. Using TWIN08 you get an Ascii version of your program without line numbers.

The first thing that struck me about it was that, while the Twin screen display is utilitarian, the ArchiText one is colourful, but ugly. The last three lines of the screen are divided into a block of four scroll boxes, a scroll bar, line and screen number displays along with filenames and a message line at the very bottom. The rest of the display is devoted to the program text, and the edit position is marked by a thin red caret which sits between characters.

The mouse is used by ArchiText for all scrolling operations and the pointer is a light blue caret when in the text area, changing to a long, thin, very unaesthetic arrow in the lower area. Position control within the current text is very precise and fast and the line-by-line scrolling is smooth – using the rectangle move command.

ArchiText can handle five files at once, with two being displayed on screen at any time. Text can be block deleted just using the mouse and copied or moved between text areas – even if the block being duplicated is in an area not currently being displayed.

Search and replace is perfectly adequate – in fact you can do block moves and copies to and from these areas as well. This feature allowed me to replace a piece of text I had accidentally deleted.

The only real problems I had were that it couldn't handle lines longer than 255 characters, and you have to press a number on the keypad to leave the star command section. These were annoying but hardly serious.

Points for

- Easy operation
- Uses the mouse

Against

- Tatty display
- Can't handle long lines

The bottom line...

If you need to work while you compile buy Twin; if you want clean simplicity get ArchiText.

Conclusion

Twin is a far more complex product than ArchiText and essentially does the same task with a lot more frills. It's also half the size – Twin is 38k whereas ArchiText occupies a massive 86k – and this is due to the inefficiencies of the C compiler. ArchiText requires work on the display – I would have preferred the real Wimp environment, not this home-grown substitute.

With all the extreme cleverness and complexity of Twin – and I've hardly mentioned its extensive buffer options – I'm still left with the question: Do we really need such convoluted facilities, or is the software going the route of the messy inefficiency of recent microprocessors?

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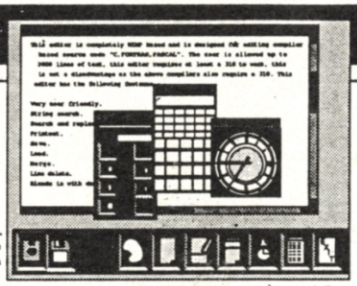

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BBC CONVERTOR, This program blends into the desktop, when a RS232 lead has been connected between the BBC and the Archimedes select the 5.25' disk icon and a window showing the files on the BBC B disk drive appears on the archimedes. To load files just select them with a mouse (as many as you want) , and from the desktop menu select load to make the files transfer automatically from the BBC to the archimedes. The baud rate is set at 19200 baud although any speed can be used, the Convertor is intelligent and recognises automatically the file types contained on the BBC's disk drive.
EDITOR, This is an optional facility for editing source text files for compilers (FORTRAN, C, PASCAL etc), to work it must be used on at least a 310 (this is not a disadvantage as none of the compilers are able to work on a 305). This advanced program blends fully into the desktop enviroment, and is very user friendly and intuitive in its use, the maximum text size is 2000 lines. The files produced are compatible with twin, it is entirely WIMP driven and needs no control/function keys.
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THE number of modems now available provides a would-be buyer with a near-impossible task when trying to compare the major features. So to remove some of the tedium involved in collating this information, here is our at-a-glance guide to the more popular makes.

The prices are current on going to press, but because these are subject to fluctuation you are advised to check with the manufacturer for up to date details.

All models featured except the Beebug Master and Watford Le Modem are BABT approved.

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Watford Le Modem	●	●			●	●		108.10	Price includes software on rom, leads and free registration to MicroLink/Telecom Gold.
Watford Apollo	●	●			●	●		108.10	Price includes software on rom, leads and £6.50 off annual membership to Prestel/Micronet.
Dataphone Designer	●	●			●	●		114.95	Price includes free registration to MicroLink/Telecom Gold. Also available as a combined pack including Zrom software and lead. Total price: £137.95
Beebug Master Modem	●	●			●	●		119.00	Fits inside Master and comes complete with Beebug Command Rom.
Miracle WS2000	●	●					●	125.00	Price includes free registration to MicroLink/Telecom Gold.
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Pace Linnet	●	●			●	●	●	174.80	Also available as a combined pack including Commstar II software, lead and free registration to MicroLink/Telecom Gold. Total price: £226.05
MicroLink multi speed	●	●	●		●	●	●	179.00	Price includes Comms software and word processor from Mini Office II, lead, free registration and telex validation to MicroLink/Telecom Gold plus one month's free connect time.
Miracle WS4000	●	●			●	●	●	195.45	Also available as a combined pack including Dialup software, lead and free registration to MicroLink/Telecom Gold. Total price: £295.95. Upgrade to 1200/1200: £287.50; upgrade to 1200 and 2400/2400: £465.75
Telemap Propak	●	●			●	●	●	222.45	Price includes PMS Dial Up software and free subscription to Micronet/Prestel.
Anglo Turbo II	●	●	●		●	●	●	264.45	
Pace Linnet 1200	●	●	●		●	●	●	274.85	Also available as a combined pack including Commstar II software, lead and free registration to MicroLink/Telecom Gold. Total price: £338.10.
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B B+ M Electron A

The ultimate hack

Enter the world of fantasy with the Mad Hatter

FOR several months a couple of discs had been sitting in my desk drawer: At the Manchester Micro User Show, Howard Roberts of Heyley Software took me gently aside and reminded me of their existence. Much chastened, as soon as I got home I began exploring Heyley's first adventure, The Ultimate Prize.

The setting of the game is a type I enjoy from time to time – straightforward Dungeons and Dragons-style swashbuckling action. A mighty warrior already, you are invited to enter a contest which has as its prize the ultimate status of deity – hence the title.

It's a three-part adventure and each must be completed before you can progress to the next. First you wander through an underground labyrinth, part two finds you exploring a forest and finally you roam mountainous territory.

The beginning is straighforward enough. You find a knife in the opening location and, not too far away, is a rope that simply asks to be cut. From then on the puzzles escalate steadily in complexity. Fortunately it is possible to explore a good deal of the labyrinth without having to solve specific problems, and this is very useful.

As I always advise, you need to examine things, sit on things, dig, jump – in fact undertake just about every conceivable action if you are to master this adventure.

Some things about the game I found very useful, others less so. The instructions are set out well. The screen layout is attractive too – Heyley uses multi-coloured text depending on whether the text describes your action, something that may be manipulated or your location.

There were, however, some very irritating aspects. The parser has a limited response at times. For example, you will come across an object described as *an empty silver flask*. A good parser would allow you to GET FLASK, GET SILVER or GET EMPTY. The Heyley parser only allows GET EMPTY.

I also felt at least one puzzle was too far-fetched, even for a Dungeons and Dragons environment. You have to leap 500 feet into a piranha-infested river. I'm not complaining about the piranhas – there's a way of dealing with them – but I think a 500 foot jump is a bit much, even for a fantastic warrior like me.

I had a further problem with the SAVE and RESTORE facilities. Whenever I restored a saved position I got the error message *Type mismatch*. The initial location description remained on screen, while the exits and any treasures shown were those belonging to the saved position.

Making several moves to get new data loaded in from the disc cured it, but this nonetheless remains a drawback. Howard tells me he is working on the parser and the protection to eliminate problems like this.

The Ultimate Prize is available from Heyley Software, 24 Ley Hey Road, Marple, Stockport SK6 6PQ on 40 or 80 track disc for BBC B, B+ and Master at £7.95 and for Master Compact at £9.95. A clue sheet is also available for an additional £1.

That's it for now, so until next month, happy adventuring.

Problem Corner

Jonathan Lee has problems. In **Escape from Pulsar 7** – how does he repair the lathe and the oven so as to bake the cake? What, if anything, can be found or done in the wrecked cabin? Jonathan would also like to know where to find the black and silver figurines in **Ten Little Indians** and how to open the gates.

Robin Keith has trouble with a few games I don't know. In **Golden Baton** how does he use the quartz to get the guard's knife? What does he do after finding the prism in **Time Machine**? Finally, how can he rescue Ant-man in **The Hulk**.

Tony Burton needs help with **Legionnaire**. Neither my colleague Pendragon nor I have it, so would someone like to qualify for a Hall of Fame rating by being the first to send in a solution?

Hatter's Helpline

Nine-year-old Stuart Quinn has a novel suggestion for dealing with Thorin in **The Hobbit**. Once you have got the ring in the goblins' dungeon, take Thorin back to the troll's cave and lock the old perisher in.

After that continue as usual until you meet Bard on the way to the mountain. Instruct him to go to the mountain and kill the dragon, walk in and collect the loot, free Thorin on the way home and Bob's your uncle.

However, I don't see how you can get maximum points this way, and I shall be offering readers assistance for the later stages of this adventure shortly.

Jonathan Lee can offer Anthony Graham some help with Micropower's **Adventure**. The runaway princess can be found in the magician's bedroom in the castle. If she bolts again, look for her in the bedroom up the beanstalk. You can kill the dragon with your bare hands, and treasures should be dropped in the left luggage office.

David Alexander has horticultural problems in the adventure **L**: He can't work out how to plant

the trees. I suspect others are in this predicament also, so here's the correct order:

```
T***T
**T**
T*T*T   * is a blank space and
**T**    T represents a tree
T***T
```

Adrian Jackson wants to know what to do with the sphere in the same game – the answer is nothing, it's purely a location marker.

Aidan Walsh has written with some **Elite** queries. Like others, he wonders if generation ships, space dredgers and transporters really exist. As I've said before, I've never come across the first two in all my roaming through the eight galaxies, but transporters definitely exist.

They can often be encountered leaving the space station en route for the planetary surface as you prepare to dock. You can have a lot of fun by blasting them if you fancy a fugitive's life.

He also asks about swapping ships: You cannot swap your type of ship; you always have a Cobra MkIII. The only method of ship exchange permitted is by using the escape capsule, which I don't advise unless you are in extremis – you lose your cargo and no-claims bonus.

Finally, Aidan wonders how to get back from *Witch Space*, happy home of the Thargoids, to normal space. All you do is lock-on to a star and jump into hyperspace as normal, but you have to have enough fuel to get there.

Deeper into the labyrinths

According to Roger White's excellent solution to **Labyrinths of LaCoshe** the thief can be an ally and then killed once his usefulness is at an end.

When you receive the message *A furtive figure just brushed past you*, it indicates that the thief has struck. He steals any treasure you are holding and takes it to his lair above the Cyclops Room – see last month's column for details of how to get there.

His usefulness to the player concerns the porcelain egg which is found up the tree in the forest. The egg can't be opened safely by the player, but if the thief steals it, he opens it to reveal an additional treasure, a tiny jewelled bird.

Once the thief has stolen the egg, check his lair to see if both the egg and bird are there. If you can't get robbed conveniently, Roger suggests going to the lair yourself, dropping the egg and going away for a while.

This is not 100 per cent foolproof – there is a slight bug here. If the egg isn't opened, take it away and try again. Roger says this always works. The main thing to remember is never to try and open the egg yourself. The thief is a random element in the game, and your chances of meeting him are about 100 to 1 for any given move.

If you want to kill the thief, you need the sword or the knife and remember that, although the odds are in your favour, he has one chance in four of killing you, so SAVE before you try. If you are successful, you can also get the thief's silver chalice.

In Labyrinths, the weight of different objects is a factor that has to be taken into account before you can expect to solve the adventure in the minimum number of moves. I'll leave you to work out the details.

Another problem that should be solved fairly early on in the game is the Round Room, which is reminiscent of Bedquilt in Colossal Adventure. Leaving the Round Room deposits you in one of six random locations until the room has been stabilised.

Don't try pushing the buttons in the Machinery Room until you have the plastic pole, or you'll get a shock. The pole can be found at a Dead End in the twisty passage maze, N, S and D from the Troll Room. The Machinery Room can be found S and S from the Troll Room by solving the riddle – no, I won't do it for you – and then doing things in a bucket.

You can push three buttons. Two of them reveal treasures as well as stabilising the Round Room, and the third provides an surprisingly attractive experience.

Once you have stabilised the Round Room, N always takes you to the room with the skin of wine, S to the Cold Room, E to the E-W path beside a ravine, W to the room with the spade, U leads to the Troll Room and D to the twisty passage maze.

Light can be a problem, too. The lamp has an inbuilt move-counter with a total life of 100. That makes the torch a necessary item, but it's vulnerable to the thief.

Roger suggests this strategy: Collect the egg, enter the caves through the Grotto and kill the Troll. Then stabilise the Round Room and set about collecting the torch, which is itself a valuable treasure.

To get the torch you first need the rope from the Very Chilly Chamber. From the Troll Room go E, N, N, E, E, D. To get back you must go S, N, N, S, S, S. Collecting the torch is a mini-adventure in its own right. There is a complex of 17 rooms in the region of the Torch Room contained a number of treasures.

Go to the Gallery, tie the rope to the rail and go D to the Torch Room. Go to the East side of the Lake via the Round Room and then into the Small Room to get the wrench and push Button V.

After that, you can go to the Control Room, using the wrench to turn the bolt in order to drain the lake. If you then throw the torch into the Cold Room you'll melt the snow and reveal another room containing a jade figure.

Whatever you do, don't enter the Small Cave while holding the torch – there's a gas leak! You can get the ruby by dropping the torch before going into the cave because you can survive in the dark just long enough. Getting the shield involves taking the spade from the Damp Cave, going to the Sandy Room and digging three times.

Well, that's all the help you're going to get on this adventure, but I hope it's enough to get you through the tougher areas.

HALL OF FAME

My thanks go to Mike and Neil Aldridge for the first full solution to Geoff Larsen's *Puppet Man*. Gray Robertson is the first person to send me a full solution and pictorial map of Robico's *The Hunt*, and Darren Higgs has provided the first pictorial map of *L*.

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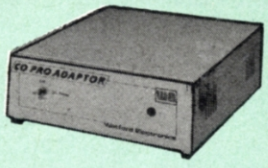

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TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

Introductory Offer: £99

(Please write in for further technical details)

Archimedes Real-Time Digitiser

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SPECIFICATION

SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Continued ——→

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- Touchtec 501 Touch Screen **£239**

TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£495**

- **NEC JC-1401P3EE 14"** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£489**

PHILLIPS Monochrome 12"
BM7502 Hi-res Green **£69**

STAR BUY

- **PHILLIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3

SWIVEL BASES

for Video Monitors

By placing your monitor on one of our professional swivel bases (see monitors drawing above), you gain the freedom to adjust the monitor viewing angle to suit your needs and thus alleviate eye strain and reduce back stress. The front mounted adjustable control dial makes adjusting the monitor viewing angle very simple.

for 12" Monitors **£7** (carr. £2.50)
for 14" Monitors **£10** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

TAXAN KP-815 PRINTER

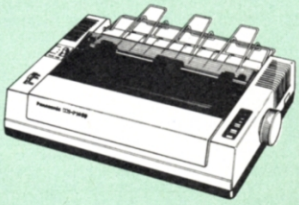
80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £159

KAGA/TAXAN PRINTERS

Taxan KP915 132 Column Printerr (carr £7)	**£275**
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)
Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£255** (carr. £7)

Single Sheet Feeder	**£175**
Tractor Feed	**£90**
Daisy Wheel (various)	**£12**
Ribbons: Standard **£4.50**; Long Life **£7**	
Extra 32K Printer Buffer (internally fitted)	**£10**

Panasonic KX-P4450 LASER PRINTER

Now available from stock. Please write in for technical details

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £275

Cut Sheet Feeder	**£65**
Additional Font Cartridge	**£25**
NEC P2200 Pinwriter Ribbon	**£6**

VARIOUS PRINTERS & ACCESSORIES

Brother HR20 Daisy Wheel	**£349**
HR20 Tractor Feed Attachment	**£110**
Epson EX800 Printer	**£346**
Epson EX1000 Printer	**£589**
Epson FX800 Printer	**£295**
Epson FX1000 Printer	**£425**
Epson GQ3500 Laser Printer	**£1290**
Star LC10 Printer	**£175**
Star LC10C Colour	**£215**
Epson LQ500 Printer	**£285**
Epson LQ800 Printer	**£399**
Epson LQ850 Printer	**£469**
Epson LQ1050 Printer	**£599**
Epson LQ2500+ Printer	**£749**
Epson LX800 Printer	**£189**
Epson SQ2500 Printer	**£975**
Epson Paper Roll Holder	**£17**
EX800/1000 Colour Option	**£55**
EX800/1000 Colour Ribbon	**£18**
HI80 Re-Fills – Set of 4 pens	**£7**
Hitachi 672 Colour Printer	**475**

CUT SHEET FEEDERS for
EX800 **£130**; EX1000 **£195**; FX800 **£135**; FX1000 **£169**; LQ/LX800 **£125**; LQ850 **£135**; LQ1050 **£75**; LX1000 **£305**.

TRACTOR FEED for
EX800/1000 **£78**; LQ800 **£44**; LQ850 **£69**; LQ1000 **£50**; LQ1050 **£75**; LQ2500 **£195**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

INTEGREX COLOUR JET PRINTER

Colour Jet 132 Printer	**£515**
Paper Roll	**£6**
Screen Dump Software	**£10**
Colour Cartridge	**£14**
Black Cartridge	**£8**
100 A4 OHP transparencies	**£55**

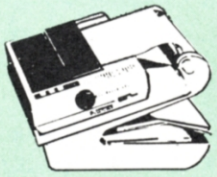
Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 printers to 1 Micro with our Printer Sharers/Changers. **(Ideal for School environments.)**

Connects	Serial	Centronics
2 to 1	£24	£25
3 to 1	£34	£35
5 to 1	£44	£45

(Cables extra at £6 each. Please specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £2.50)
132 Column version £26 (carr. £2.50)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

PRINTER LEADS

Centronics lead for the BBC

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**
Compact's Special Centronics Lead	**£9**
RS232 Cable	**P.O.A.**
IBM/Archimedes Parallel 1 metre lead	**£7**
Double ended 36 way Centronics Lead	**£9**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
Brother HR15/20	**£3.00**	**£5.00**
EX/LQ800	**£7.50**	**£4.50**
EX/LQ1000	**£8.00**	**£5.00**
RX/FX80/85/800/MX80	**£4.00**	**£4.95**
RX/FX100/1000	**£6.00**	–
Kaga/Texan KP810/815	**£5.25**	**£4.00**
LQ2500	**£9.00**	**£5.50**
LX80/86	**£4.00**	**£4.50**
LX800	**£4.00**	**£4.75**
M1009/GLP	**£4.00**	**£3.75**
Panasonic KX1080/81	**£4.50**	**£4.75**
SQ2500	**£25.00**	**£5.50**
Star NL10	**£4.00**	**£4.50**
Microvitec Metal	–	**£5.50**

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper **£7**
- 2,000 Sheets 9½" × 11" Fanfold Paper **£12**
- 1000 Sheets 9½" x 11" NCR 2 Part Fanfold **£19**
- 1,000 Sheets 15" × 11" Fanfold Paper **£9**
- 1000 Sheets true A4 Fanfold Paper **£11**
- 2000 Sheets true A4 Fanfold Paper **£20**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £2)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

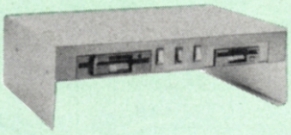
DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers
Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

BBC Screen Dump	**£10**
Colour Ribbon	**£6**
Black Ribbon	**£6**

30 Megabyte Winchester Drive

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17"X disc interface).

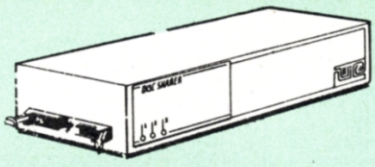
Launch Offer **£425** (Carr. £12)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued ——→

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£58**
- *Acorn's 0.90 DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

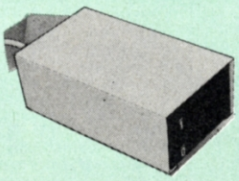
Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400S

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- CLS35 400K Unit **£69**
- CLD35 800K Uni **£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£6

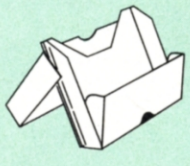
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3 ½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**

* Not lockable

- **M10** – holds upto 10 Data Cartridges **£15**



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

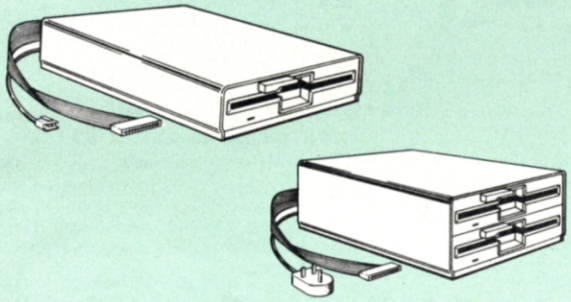
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £82	CLD 400 £168	CS 400S £92	CD400 £188
800K (1.44M)		CLD 800S £162		CD 800S £182

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives
simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* **£8.00**
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* **£9.75**
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* **£12.50**
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* **£12.75**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£28**
- *10 × 3½" S/S D/D 40/80 track Discs* **£13.50**
- *10 × 3½" D/S D/D 40/80 track Discs* **£15**
- *10 × 3½ High Density Diskettes* **£43**

FREE

This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise above.
Offer valid while stocks last.

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£13**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£6.50**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£8**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£9**
- *3" Double Sided Discs* **£3** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

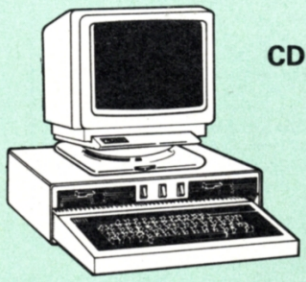
WATFORD's WINCHESTER DRIVES

PRICES SLASHED

- 10 Megabyte Unit with ADFS **£375**
- 30 Megabyte Unit with ADFS **£425**

(30 Meg Unit is supplied complete with utilities software. For full details see Page 6 of our advert)

CDP800S **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 4 of our advert)

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued ⟶

NOMINATED FOR BRITISH MICRO COMPUTING AWARDS 1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."
". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."
"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".
The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:
"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:
"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:
"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:
- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	**£54**
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	**£82**
QUEST MOUSE ONLY	**£25**
QUEST PAINT SOFTWARE	**£32**
QUEST FONT DISC	**£12**
ConQuest 32K ROM Package	**£29**
QUEST MAT	**£3**
Part-exchange your old Mouse for a New QUEST MOUSE for only	**£23**
GXR ROM for BBC Micro	**£22**

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21
(Price includes FREE software Disc and Operating Manual)

RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£52
RB2 including Quest Paint	£78

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE

ONLY: £59 Inc. Super Art package
(carr £1.50)
(Please specify for BBC, Master or Compact)

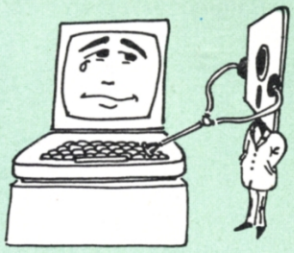
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX 3D ZICON Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

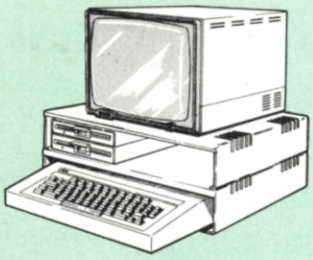
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

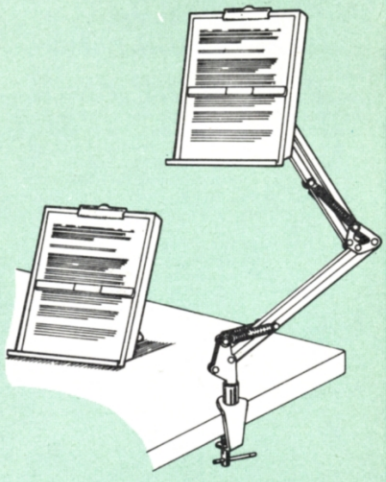
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**

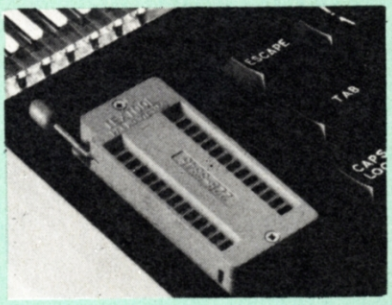
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£7.50**; Quad **£11**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

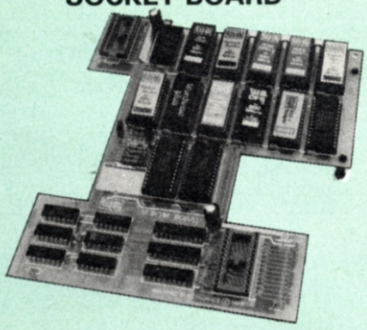
● Write protection (useful in a variety of circumstances).
● Read protection (allows recovery from ROM crashes).
● Compact construction.
● May be fitted in systems even with a ROM board.
● Multiple units may be fitted, even with a ROM board.
● No overheating or overloading problems.
● Free utilities disc supplied.
● Can be used as a 16K PRINTER BUFFER.
● Ideal for professional software development.
● Supplied with utilities software disc.

Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

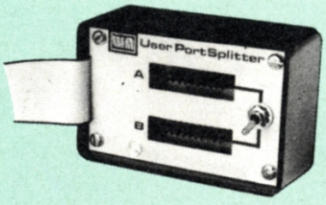
● The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
● Increase your BBCs capacity for ROMs from 4 to 16.
● **No soldering required.**
● Very low power consumption.
● Minimal space required.
● Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
● Socket 14 takes two 6264 RAM chips.
● Read protect to make RAM "Vanish") allows recovery from ROM crashes.
● Battery backup option for RAM chips.
● Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

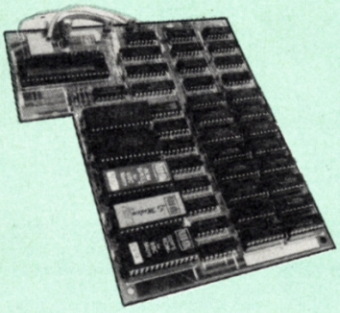
Only: £8

USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£45***
- ROM/RAM card with 64k dynamic RAM ***£59***
- ROM/RAM card with a massive 128k dynamic RAM **£89**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£9.20**
- Battery backup **£3**
- Read and Write protect switches ..... **£2** each

Complete ROM-RAM board
All options installed **£106**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£82***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£46
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£25

Wordwise £23

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM **£76**

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£72

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

EPSON NLQ ROM
for the BBC Micro

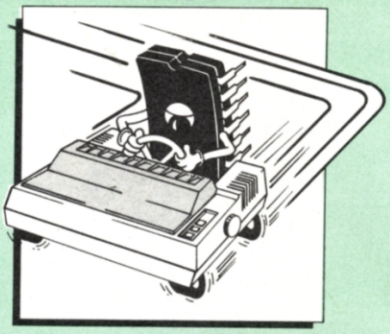
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

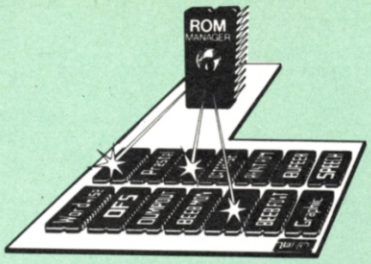
For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

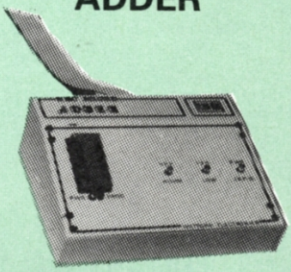
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

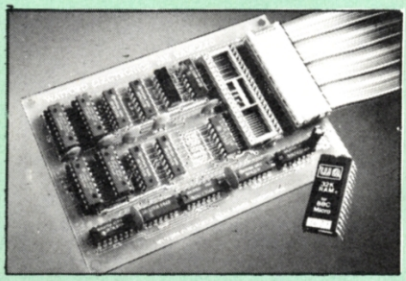
£75 (£3 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K SHADOW RAM- Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£4.95
15 Hr Wordprocessing BBC/WW & WW+	£4.95
30 Hour BASIC (BBC Micro)	£9.95
6502 Assembly Language Program	£19.95
6502 Application	£13.95
6502 Development Package	£7.50
6502 Programming the	£16.95
6502 Reference Guide	£10.95
68000 Assembly Language	£15.95
68000 Assembly Language Prog.	£19.95
68000 Assembly Language Techniques	£24.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£17.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£9.95
Advanced User Guide for BBC	£10.95
Amiga Hardware Ref Manual	£23.70
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Language Prog. for the BBC	£9.95
Basic ROM User Guide	£11.95
BBC – Advanced Graphics with the	£10.95
BBC – Advanced Programming Techniques for	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro Programing Tips	£9.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C Big Red Book of	£7.50
C for Beginners	£10.95
'C' Introducing	£9.95
C for Programmers	£9.95
C Programming Lang.	£23.95
COMAL – Introduction to	£9.50
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
DOS Instant Reference (up to 3.3)	£10.95
DOS, Mastering for Versions upto 3.3	£19.95
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
dBase III Plus	£12.95
dBASE III Plus, Quick Ref. Guide	£4.95
dBase III Tips & Tricks	£14.25
File Handling on BBC Micro	£7.95
FORTH – Advanced	£9.95
FORTH – A Text Reference	£19.10
FORTH – Introduction to	£8.95
FORTH on the BBC Micro	£9.95
FORTH – Starting	£19.10
Hackers Handbook - New	£6.95
Hitch-Hikers Guide to A.I.	£8.95
Interfacing and Robotics	£15.95
Introduction to COMAL	£9.50
Introduction to FORTH	£8.95
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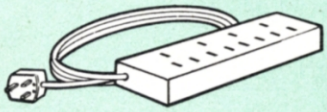

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Automatic archiving

John Tissandier helps keep crashes less critical

PROGRAM development can be a risky business – you make a couple of changes to your masterpiece and suddenly it doesn't work. So you go back but can't quite remember what you did – and you are left tracing a bug that you put in yourself. The Automatic Archiver can help you by keeping one earlier generation of any file that is SAVEd or *SAVEd. So when you save a version of your program the archiver keeps the previous copy.

When a SAVE or *SAVE is issued the utility checks to see if a file of the same name already exists on the disc. If it doesn't the disc operation continues as normal. But if it does, the original file is renamed as *b.filename* before the new one is saved – producing two versions of the program on the disc. If we save the file with the same name a third time the following happens:

- *b.filename* is deleted.
- The existing *filename* becomes *b.filename*.
- The new one is saved as *filename*.

So the two latest versions of a file will always be on disc and it works with any software that uses the standard *osfile* routine. The utility can be overridden by specifying a directory in the filename. In addition, by providing a drive number multi-drive systems can be incorporated.

Type in the source program, check it with Get it

```
  10 REM Automatic Archiver
  20 REM by John Tissandier
  30 REM (c) The Micro User
  40 MODE 7:PROCuser:PROCinit
  50 PROCtitle_page:PROCassemble
  60 PROCsave:PRINT"Utility enabled"
  70 PRINT'CHR$148STRING$(38,CHR$172)
  80 END
  90 DEF PROCuser
 100 zero=&70:code=&900
 110 bdir$="b":mc$="ARC"
 120 c1$="Model B":c2$="Master"
 130 computer$=c1$
 140 b1$="No action"
 150 b2$="Reset vector"
 160 b3$="*RUN utility"
 170 break$=b2$:ENDPROC
 180 DEF PROCinit
 190 filev =&212:osgbpb=&FFD1
 200 osbyte=&FFF4:oscli =&FFF7
 210 bufptr=zero:filenm=zero+2
 220 ENDPROC
 230 DEF PROCtitle_page:PRINT
 240 PRINTCHR$148STRING$(38,CHR$172)
 250 FOR X%=0 TO 1:PRINTTAB(10)CHR$141"
Automatic Archiver":NEXT
 260 PRINTCHR$148STRING$(38,CHR$172)'
 270 PRINT" For single_sided single dri
ve"
 280 PRINT" Computer"TAB(19)"="CHR$129c
omputer$
 290 PRINT" Archive directory ="CHR$129
bdir$
 300 PRINT" Break key action  ="CHR$129
break$
 310 PRINT" Zero page usage   ="CHR$129
"&";~zero"-&";~zero+3
 320 PRINT" Machine code"TAB(19)"="CHR$
129"&";~code"-&";
 330 ENDPROC
 340 DEF PROCassemble
 350 FOR L%=0 TO 2 STEP 2
 360 P%=code:[OPT L%
 370 .init
 380  LDA filev:CMP #start MOD256
 390  BNE ok:LDA filev+1
 400  CMP #start DIV256:BEQ i_exit
 410 .ok
 420  LDA filev:STA oldvec
 430  LDA filev+1:STA oldvec+1
 440  LDA #start MOD 256:STA filev
 450  LDA #start DIV 256:STA filev+1
 460 ]:PROCbreak:[OPT L%
 470 .i_exit RTS
 480 .start:CMP #0:BNE exit
 490  STA found:STX bufptr
 500  STY bufptr+1:LDX #1:LDY #1
 510 .loop1:LDA (zero),Y
 520  STA zero+2,X:DEX:DEY:BPL loop1
 530 \ Check if directory specified
 540 .loop2
 550  INY:INY:LDA (filenm),Y
 560  CMP #ASC".":BEQ restore
 570  INY:CPY #5:BNE loop2
 580 ]:PROCstore_master:[OPT L%
 590 \ Store current drive/directory
 600  LDA #data6 MOD 256
 610  STA osgbpb_block+1
```

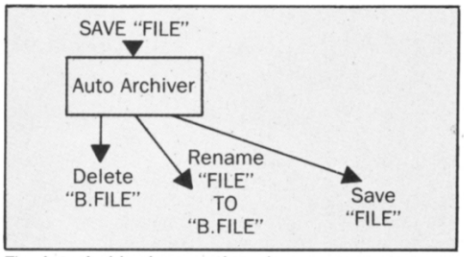
This is one of hundreds of programs now available FREE for downloading on MicroLink

```
 620  LDA #data6 DIV 256
 630  STA osgbpb_block+2
 640  LDX #osgbpb_block MOD 256
 650  LDY #osgbpb_block DIV 256
 660  LDA #6:JSR osgbpb
 670 \ Check if current directory
 680 \ same as backup directory
 690  LDA current_dir:AND #&DF
 700  CMP #(ASCbdir$ AND &DF)
 710  BNE dir_ok
 720 \ Restore registers
 730 .restore:LDX bufptr
 740  LDY bufptr+1:LDA #0
 750 .exit
 760  JMP (oldvec)
 770 \ Check if drive specified
 780 .dir_ok:LDY #0:LDA (filenm),Y
 790  CMP #&3A:BNE no_drive
 800 \ Change drive
 810  INY:LDA (zero+2),Y
 820  STA command+4:LDA #0:JSR cli
 830 \ Copy filename to command line
 840  LDY #3
 850 .no_drive:DEY:LDX #&FF
 860 .loop3:INX:INY:LDA (zero+2),Y
 870  STA command+6,X
 880  STA command+16,X
 890  CMP #&21:BCS loop3
 900  LDA #&0D:STA command+16,X
 910  LDA #&20
 920 .loop4:STA command+6,X
 930  INX:CPX #8:BNE loop4
 940 \ Change directory to backup
 950  LDA #ASCbdir$:STA dir
 960  STA command+4:LDA #1:JSR cli
 970 \ Set values in osgbpb block
 980 .next_dir:LDA #0:LDX #4
 990 .loop5:STA osgbpb_block+8,X
1000  DEX:BNE loop5
1010 .next_file
1020  LDA #data8 MOD 256
1030  STA osgbpb_block+1
1040  LDA #data8 DIV 256
1050  STA osgbpb_block+2
1060  LDA #1:STA osgbpb_block+5
1070  LDA #0:LDX #3
1080 .loop6:STA osgbpb_block+5,X
1090  DEX:BNE loop6
1100 \ Read filename on disc
1110  LDX #osgbpb_block MOD 256
1120  LDY #osgbpb_block DIV 256
1130  LDA #8:JSR osgbpb
1140  BCS no_more_files
1150 \ Compare filenames
1160  LDY #0
1170 .next_char:LDA command+6,Y
1180  CMP #&20:BEQ end_filename
1190  INY:CMP data8,Y:BEQ next_char
1200  BNE next_file
1210 .end_filename
1220  INY:LDA data8,Y:CMP #&20
1230  BNE next_file
```

B B+ M

Right! and save it as ARC/SRC. When run, the routine is installed and the code is saved as ARC. From then on you can run it from disc by typing *ARC.

The program can create two versions – for the BBC B and the Master. For the latter change line 130 to:



The Auto Archiver's operation when a save command is issued.

```
computer$=C2$
```

You can also modify some of the program variables to configure it to your requirements. The backup directory name is held in *bdir$*, *zero* is the start address of the zero page bytes required, and *code* is the start address of the machine code.

The final user parameter *break$* controls the action of the Break key: ARC works by changing the address in the vector *filev*. Pressing Break normally resets all vectors, therefore although the code will still be in place *filev* will no longer point to it.

To get round this you can either arrange for the utility to be simply disabled, have it automatically re-initialise itself or set the Break key to perform *ARC which will re-run the routine.

FILE SAVE PROBLEMS

If a file is saved but no backup is produced check the following points:

- *The current directory has been set to the directory selected for backups. The routine will be exited if this is detected, though the normal SAVE operation will proceed.*
- *A directory is specified in the filename. This is the method for overriding the backup operation. Use *DIR instead to select a different directory.*

```
1240 \ Filename found on disc
1250  LDA dir:CLC:ADC found:STA found
1260 .no_more_files
1270  LDA current_dir:CMP dir
1280  BEQ disc_checked
1290 \ Reset original directory
1300  STA dir:STA command+4:LDA #1
1310  JSR cli:LDA #0:BEQ next_dir
1320 .disc_checked
1330  LDA #ASC".":STA command+5
1340  LDA current_dir:CLC
1350  ADC #ASCbdir$:CMP found
1360  BNE skip
1370 \ Delete old backup
1380  LDA #ASCbdir$:STA command+4
1390  LDA #&0D:STA command+13
1400  LDA #2:JSR cli
1410  LDA current_dir:STA found
1420 .skip
1430 \ Rename last version to backup
1440  LDA current_dir:CMP found
1450  BNE reset_drive:STA command+4
1460  LDA #&20:STA command+13
1470  LDA #3:JSR cli
1480 .reset_drive
1490  LDA current_drive:STA command+4
1500  LDA #&0D:STA command+5
1510  LDA #0:JSR cli
1520 ]:PROCrestore_master:[OPT L%
1530 \ Restore registers
1540  LDX bufptr:LDY bufptr+1
1550  LDA #0:JMP (oldvec)
1560 \ Assemble command line
1570 .cli
1580  ASL A:ASL A:TAX:LDY #0
1590 .loop7
1600  LDA commands,X:STA command,Y
1610  INX:INY:CPY #4:BNE loop7
1620  LDX #command MOD256
1630  LDY #command DIV256
1640  JMP oscli
1650 \
1660 .oldvec OPT FNds(2)
1670 ]:PROCbreak_data:[OPT L%
1680 .found  OPT FNds(1)
1690 ]:PROCmaster_data:[OPT L%
1700 .osgbpb_block OPT FNds(13)
1710 .data6 OPT FNds(1)
1720 .current_drive OPT FNds(2)
1730 .current_dir OPT FNds(1)
1740 .command
1750  OPT FNs(STRING$(5," ")+CHR$13+STR
ING$(8," ")+bdir$+"."+STRING$(8," "))
1760 .dir OPT FNds(1)
1770 .data8 OPT FNds(8)
1780 \ End of filename marker
1790  OPT FNb(&20)
1800 .commands
1810  OPT FNs("DR. ")
1820  OPT FNs("DIR ")
1830  OPT FNs("DEL.")
1840  OPT FNs("REN.")
1850 ]:NEXT:PRINT;~P%
1860 CALL init:ENDPROC
1870 DEF PROCbreak
1880 IF break$=b1$ REM Do nothing
1890 IF break$=b2$ PROCreset_break
1900 IF break$=b3$ PROCrun_utility
1910 ENDPROC
1920 DEF PROCreset_break
1930 [OPT L%
1940  LDA #247:LDX #&4C
1950  LDY #0:JSR osbyte
1960  LDA #248:LDX #init MOD256
1970  LDY #0:JSR osbyte
1980  LDA #249:LDX #init DIV256
1990  LDY #0:JSR osbyte
2000 ]:ENDPROC
2010 DEF PROCrun_utility
2020 [OPT L%:LDX #break MOD 256
2030  LDY #break DIV 256:JSR oscli
2040 ]:ENDPROC
2050 DEF PROCstore_master
2060 [OPT L%:LDY #0
2070 .loop8:LDA (bufptr),Y
2080  STA osfile_block,Y
2090  INY:CPY #18:BNE loop8
2100  LDY #0:.loop9
2110  LDA (filenm),Y:STA filename,Y
2120  INY:CPY #24:BNE loop9
2130 ]:ENDPROC
2140 DEF PROCrestore_master
2150 [OPT L%:LDY #0
2160 .loop10:LDA osfile_block,Y
2170  STA (bufptr),Y:INY
2180  CPY #18:BNE loop10
2190  LDY #0:.loop11
2200  LDA filename,Y:STA (filenm),Y
2210  INY:CPY #24:BNE loop11
2220 ]:ENDPROC
2230 DEF PROCbreak_data
2240 IF break$<>b3$ ENDPROC
2250 [OPT L%:.break
2260 OPT FNs("KEY10*"+mc$+"|M")
2270 OPT FNb(&0D):]:ENDPROC
2280 DEF PROCmaster_data:[OPT L%
2290 .osfile_block OPT FNds(18)
2300 .filename OPT FNds(24)
2310 ]:ENDPROC
2320 DEFFNb(B%):?P%=B%:P%=P%+1:=L%
2330 DEFFNs(s$):$P%=s$:P%=P%+LENs$:=L%
2340 DEFFNds(N%):LOCAL B%
2350 FOR B%=1 TO N%:?P%=0
2360 P%=P%+1:NEXT:=L%
2370 DEF PROCsave
2380 $&700="SAVE $."+mc$+" "+STR$~code+
" "+STR$~P%
2390 X%=0:Y%=7:CALL oscli
2400 PRINT" Saved as"CHR$129mc$
2410 ENDPROC
```

Get it right!

10 =	0	0	130 =	6103	A
20 =	0	0	140 =	DB66	E
30 =	0	0	150 =	77BC	F
40 =	5092	2	160 =	9516	2
50 =	CCE1	4	170 =	602B	2
60 =	2E4C	9	180 =	40D7	2
70 =	FD7B	7	190 =	EB5D	7
80 =	FD2E	9	200 =	E042	E
90 =	30DB	6	210 =	2222	E
100 =	1232	E	220 =	ED0F	B
110 =	8DB1	6	230 =	FDDF	B
120 =	4AE3	A	240 =	4F53	4
250 =	764B	B			
260 =	BEAE	9			
270 =	CF20	0			
280 =	B91E	C			
290 =	58B2	1			
300 =	C719	F			
310 =	C4DE	3			
320 =	7B5A	F			
330 =	ED0F	5			
340 =	98A5	C			

Turn to Page 108 ▶

◀ From Page 107

```
350 = AAB9 C
360 = 7CBB 7
370 = 6272 C
380 = 3750 0
390 = 3664 0
400 = 306A 1
410 = 5B1E 9
420 = F8C3 1
430 = ACCE F
440 = E490 C
450 = 8265 C
460 = F772 5
470 = FDD7 6
480 = 5391 E
490 =  8FC 4
500 = 8B2C 3
510 = 54AC A
520 = 10E4 C
530 =    0 C
540 =  372 6
550 = DCEC 6
560 = 3C8B 6
570 = AEC1 9
580 = CA5F 0
590 =    0 0
600 = ED74 F
610 = BE3C F
620 = A9F7 1
630 = 8E5F 0
640 =  F1A 2
650 = 9E6F 3
660 = D9AF 0
670 =    0 0
680 =    0 0
690 = 9605 0
700 = F431 8
710 = A384 4
720 =    0 4
730 = D13E 9
740 = 34AA A
750 = DC83 E
760 = 8802 F
770 =    0 F
780 = 7B98 A
790 = 2321 4
800 =    0 4
810 = E70B 4
820 = 3F4D 4
830 =    0 4
840 = AC92 9
850 = 4704 1
860 = CDB5 1
870 = 9259 7
880 = 3014 9
890 = 907A 2
900 = 808C 2
910 = 1119 1
920 = 98E4 5
930 = 6ED7 D
940 =    0 D
950 = F920 7
960 = D46E 1
970 =    0 1
980 =  816 A
990 = 2F1B 4
1000 = A0A2 1
1010 = 6362 A
1020 = DFFC 7
1030 = BE3C 5
1040 = 9B7F E
1050 = 8E5F 9
1060 = 1EA4 5
1070 = 9DA3 6
1080 = DB22 E
1090 = 90C1 C
1100 =    0 C
1110 =  F1A 6
1120 = 9E6F 8
1130 = C939 A
1140 = 279D D
1150 =    0 D
1160 = 9CF1 6
1170 = 19A6 B
1180 = E8E6 5
1190 =  78F D
1200 = 8A8D 4
1210 = 36EF 1
1220 = 4EEC B
1230 = 8A8D F
1240 =    0 F
1250 =  EBF E
1260 = 7D92 0
1270 = 43B5 7
1280 = 99B2 2
1290 =    0 2
1300 = 911B 7
1310 = 41C8 5
1320 = 58AC 5
1330 = 676C 4
1340 = CB3E B
1350 =  6CB 7
1360 = CAA1 3
1370 =    0 3
1380 = EF26 E
1390 = 1BED 9
1400 = FC9E 9
1410 = F535 A
1420 = BA0A F
1430 =    0 F
1440 = 4D6C 8
1450 = 76DE A
1460 = 53CD F
1470 = 17BD 8
1480 = FB18 F
1490 = 7D0A A
1500 = 3A46 7
1510 = 3AF9 6
1520 =  CE8 8
1530 =    0 8
1540 = 8BCF 5
1550 = 2BD4 1
1560 =    0 1
1570 = E4E7 2
1580 = F6EA 4
1590 = 53D7 0
1600 =  168 1
1610 = FEF0 5
1620 = 615B F
1630 = 22CF 8
1640 = 1B15 A
1650 =    0 A
1660 = 47E9 5
1670 = 2FB9 C
1680 = 3D53 2
1690 = F8B9 8
1700 = CA33 7
1710 = 4D1D 9
1720 = C386 F
1730 = 6420 5
1740 = E454 3
1750 = 300B B
1760 = B64F 9
1770 = E713 3
1780 =    0 3
1790 = 130E D
1800 = A75E 6
1810 = D721 D
1820 = 32C3 B
1830 = 1B14 A
1840 = 6119 D
1850 = C053 F
1860 = B06A C
1870 = 7384 E
1880 = 2242 8
1890 =  112 7
1900 = 4148 2
1910 = ED0F 8
1920 = 94EA 4
1930 = 1EF3 0
1940 = B75D E
1950 =  8AA 2
1960 = 74CF 3
1970 =  8AA D
1980 = 3183 5
1990 =  8AA 2
2000 = 1BCE 4
2010 = 7A4C F
2020 = A1E4 2
2030 = E15B 5
2040 = 1BCE 9
2050 = 8A1A E
2060 = 6C9D 5
2070 = D245 9
2080 = D147 7
2090 = 380D 5
2100 =  22F C
2110 = 8B55 7
2120 = DE7A E
2130 = 1BCE 0
2140 = 3E29 8
2150 = 6C9D 2
2160 = E052 6
2170 = B8F6 F
2180 = EA35 E
2190 = A099 6
2200 = 8B96 D
2210 = FF68 5
2220 = 1BCE 3
2230 = 1334 C
2240 = 4D57 1
2250 = 22C8 A
2260 = 45A5 F
2270 = E728 0
2280 = B85A A
2290 = E065 6
2300 = B687 E
2310 = 1BCE 6
2320 =  D4A 2
2330 = 1F5E 8
2340 = 19F4 2
2350 = 79D6 A
2360 = CE1D C
2370 =  EB7 C
2380 = 733D 1
2390 = C836 8
2400 = 6ABA 4
2410 = ED0F 6
```

This listing is included in this month's tape & disc offer. See order form on Page 135.

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Check your Leaky Listing corrections

HERE are the corrections for last month's Leaky Listing, the Printer Set-up program that was on Page 26. Remember there is always more than one way to solve a problem, so provided you've found the errors, you may be right even if you've changed the program in a different way to us.

In line 40 the quotes at the end are missing, as is the $ sign after the GET on line 120. The UNTIL command at 130 should have an AND instead of OR to give:

```
130 UNTIL A$>"0" AND A$<"5"
```

since, as it stands, anything typed at the prompt has to be either be above 0 or below 5 – that's all numbers – and what we want is to allow past only values that are between, not including, 0 and 5.

Line 180 gives a Type mismatch error because we're trying to compare a string with a number: The 4 should be in quotes.

A common error when writing short routines with procedures is missing the END from the main routine. In this utility if you select option 4 to quit, PROCrestart will be executed – thereby cancelling all the effects implemented – and the error *No PROC* will be generated when Basic hits ENDPROC. So an extra line is needed:

```
185 END
```

In line 200 "@" needs to be preceded by ASC to give the Ascii value rather than the string. The final error won't be noticed until you request condensed type, when you'll get:

```
No such PROC/FN at line 160
```

But, as we cannot say often enough, just because the error is given at line 160, the actual mistake may be somewhere else. In this case line 210 where we have PROCCondense, instead of PROC-condense. The upper/lower case discrepancy generates the error.

As for the poor display, by adding a CLS after the REPEAT in line 30 and a semi-colon – ; – at the end of line 110, the whole screen becomes much tidier.

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B B+ M

Pop-up perfection

Chris Nixon adds a utilities package to his Genie Organiser and waxes lyrical over its data handling capacity

Product: Genie Utilities
Price: £9.95 (disc)
Supplier: Permanent Memory Systems, 38 Mount Cameron Drive North, East Kilbride, Scotland G74 2ES.
Tel: 03552 32796

SINCE becoming the proud possessor of Genie, the electronic organiser for the BBC Micro and Master, I've become an addict. My complete address book has been computerised and I now have dozens of quick programming tips available at a keystroke in Genie's notepad. The only problem is that it's hard to use a BBC Micro on a train.

I certainly hadn't found anything to be lacking from Genie's comprehensive collection of goodies, so when the existence of the Genie utility disc came to my attention, I was eager to investigate its possiblities.

Created as a direct result of customer suggestions, the new utilities allow you to make hard copies of the information or produce files suitable for transfer to other packages or even other micros such as the Z88.

Available in all possible disc sizes and formats, the disc contents are identical. Booting up presents you with a short menu containing four options: Address Book, Notepad, Desk Diary and Phone Book. The stylish Genie banner, complete with lantern and Genie, is displayed at the top of the screen.

Selecting Address Book produces another menu, this time containing five choices. First is the Print by keyword option which allows you to make hard copies of all addresses matching a given name, occupation, street or postal area.

You can also print all addresses that fall between two given limits. This means that you can furnish two surnames, and any addresses whose surname fields fall alphabetically between these names will be printed.

The next two options are similar, except that the output is to a spooled file, using a filename of your choice. So you can now export data from different sections of Genie into Mini Office II, View or Wordwise.

The final option in this section imports data into Genie's address book from tape or disc. Your data must match the format expected by Genie exactly, however.

Failure to ensure this could fill up huge areas of the address book with garbage which could take ages to delete, item by item. Still, this is a very valuable option for those who already have a computerised address book, but would like it transferred into Genie's much more accessible environment.

Going back to the main menu, Notepad comes next. Offering four choices similar in function to the address book utilities: You can print items in page number range and keyword, and send both to a named spooled file.

The Desk Diary option contains some of the most interesting utilities. The first two allow you to output diary entries, which fall between and include two dates, either as hardcopy or a spooled file.

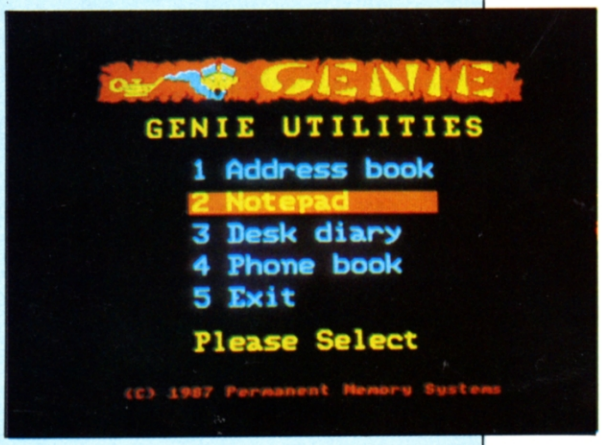
Next come two very useful facilities: You can print a planner for a particular week containing all the diary entries and including a neat little calendar for the month in which that week falls.

Alternatively, you can print out a calendar for any month this century. As you can imagine, a couple of minutes would see a full year's calendar printed – which, by the way, is just the right size for a wallet, or for pinning to your in tray.

The final item on the main menu, Phone Book, contains two options. You can choose either to print or spool the whole phone book, the result being a very neatly formatted list with a gap of one line between each letter of the alphabet.

Having thought that my personal organisation was complete thanks to Genie, I find that whereas before I had to manually copy information now I am free to manipulate the data as I please. And at last I can print the data I'll need while travelling on that train.

The Genie Utilities Disc completes what was already an incredibly useful package, and transforms it into what must surely be the ultimate personal filing system for the BBC Micro.



Choosing an address range

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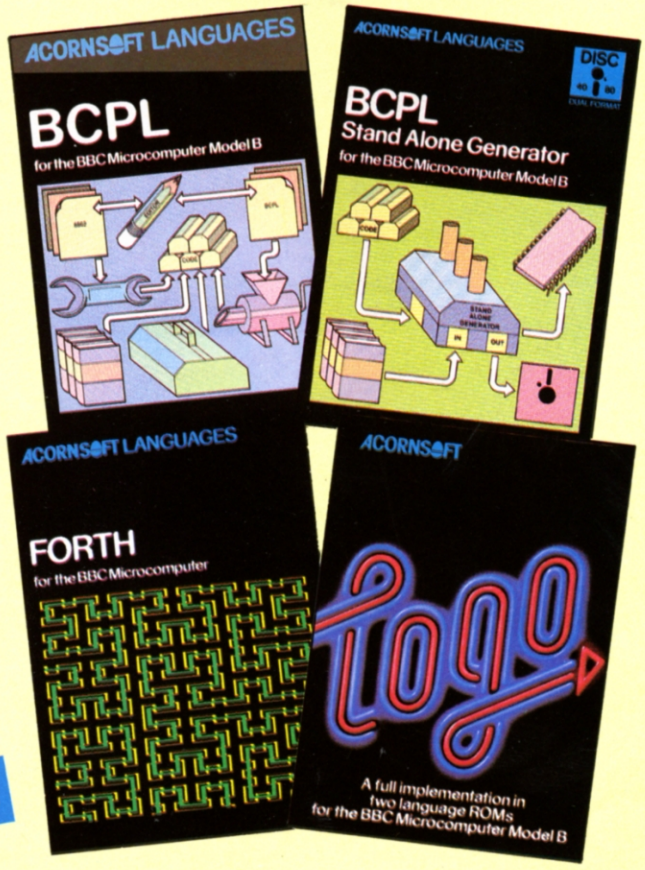

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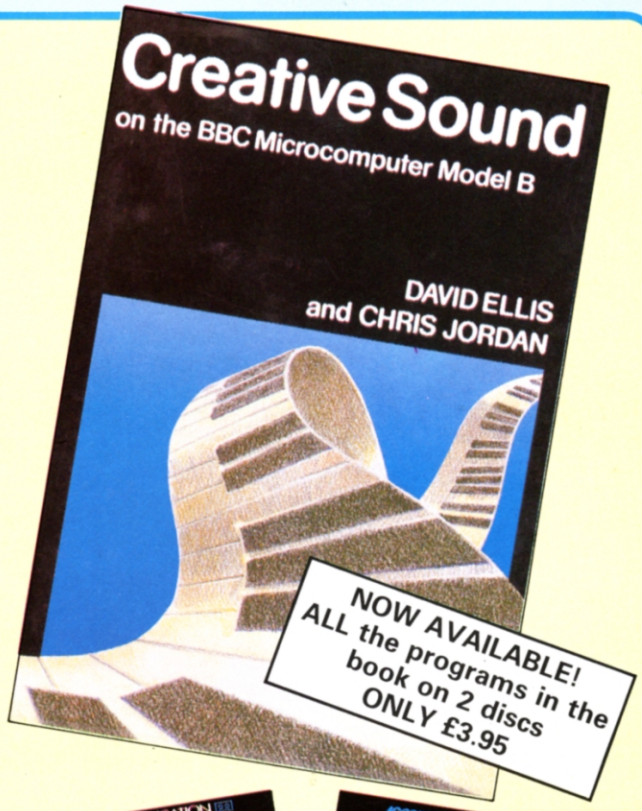

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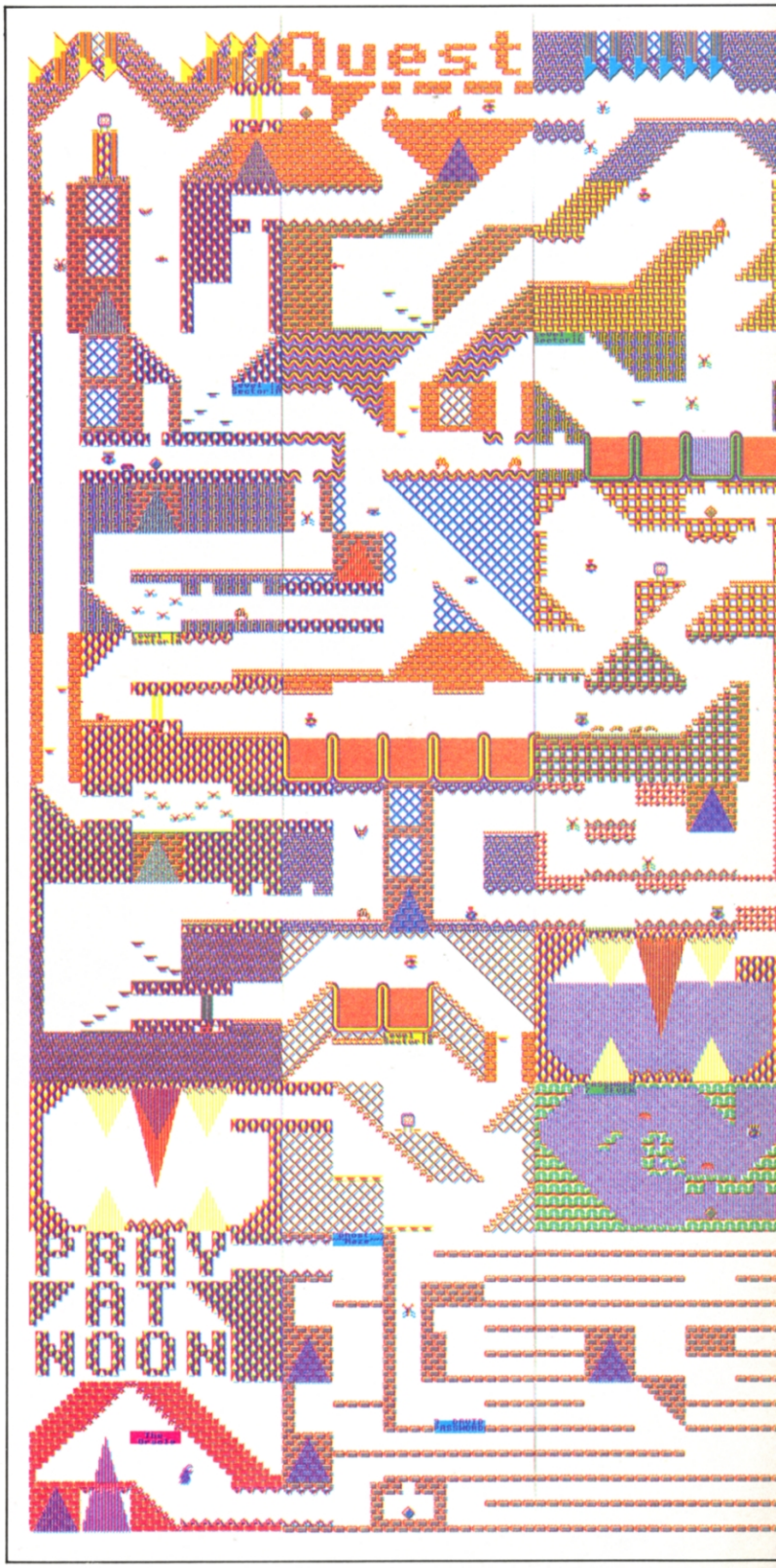
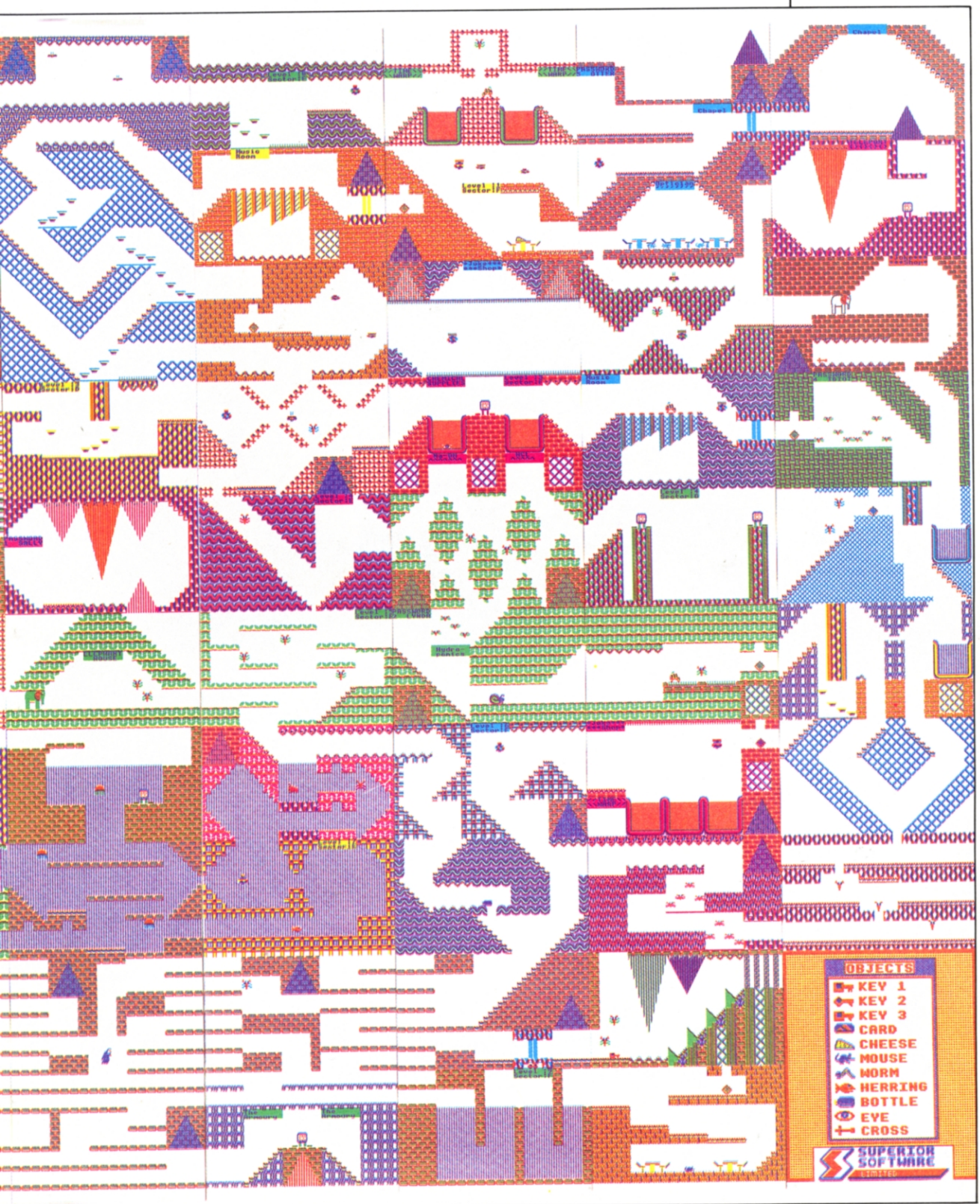
TO ORDER TURN TO THE FORM ON PAGE 135

THE MICRO USER

map of Quest

We've received lots of requests for assistance with Superior Software's arcade adventure Quest – reviewed in the May issue of The Micro User. *Now – as an exclusive – we present for you the complete map of the labyrinth. Its accuracy is assured by the fact that it was composed by Tony Oakden – the author of this superb package – and produced by him on an Integrex 132 colour jet printer.*

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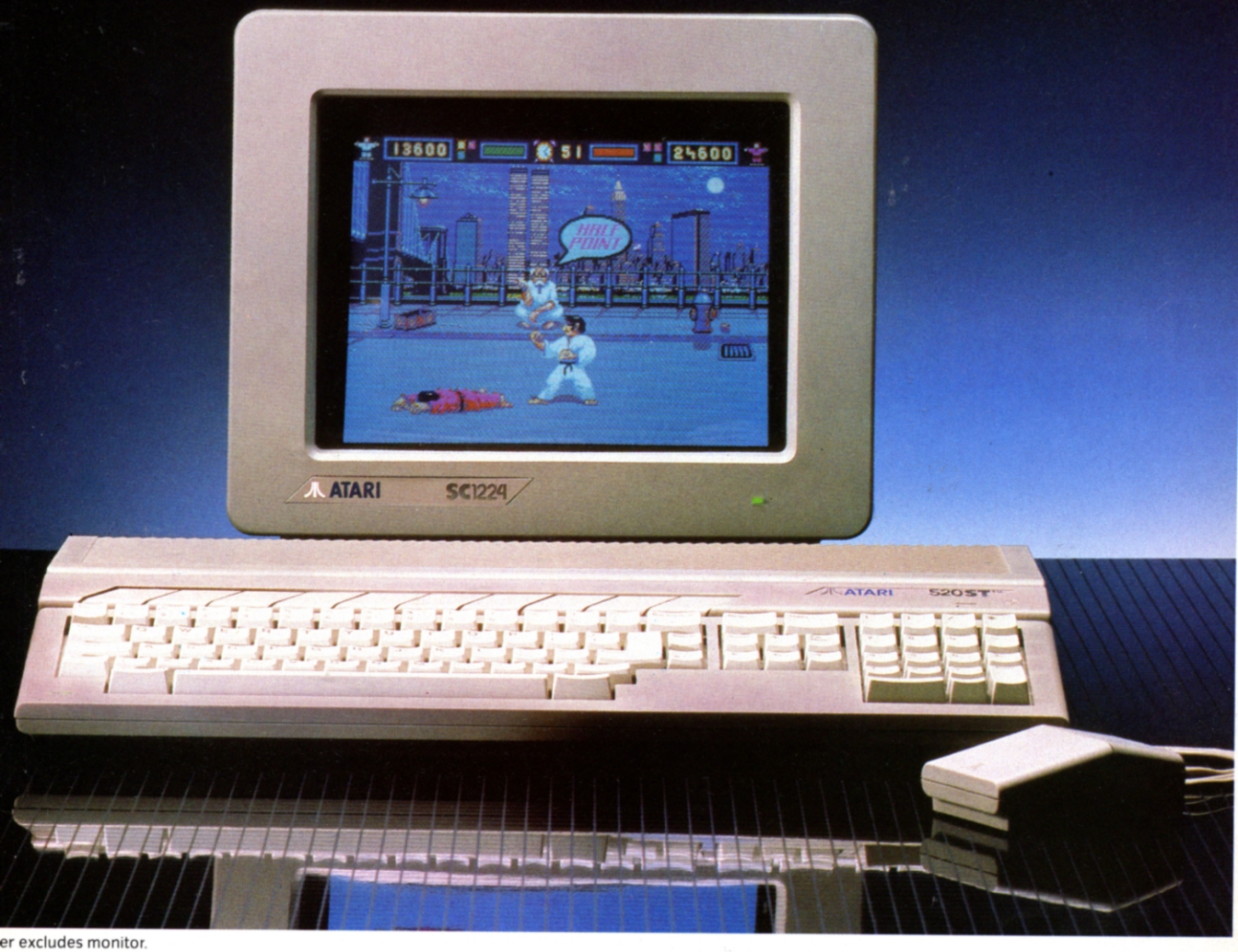

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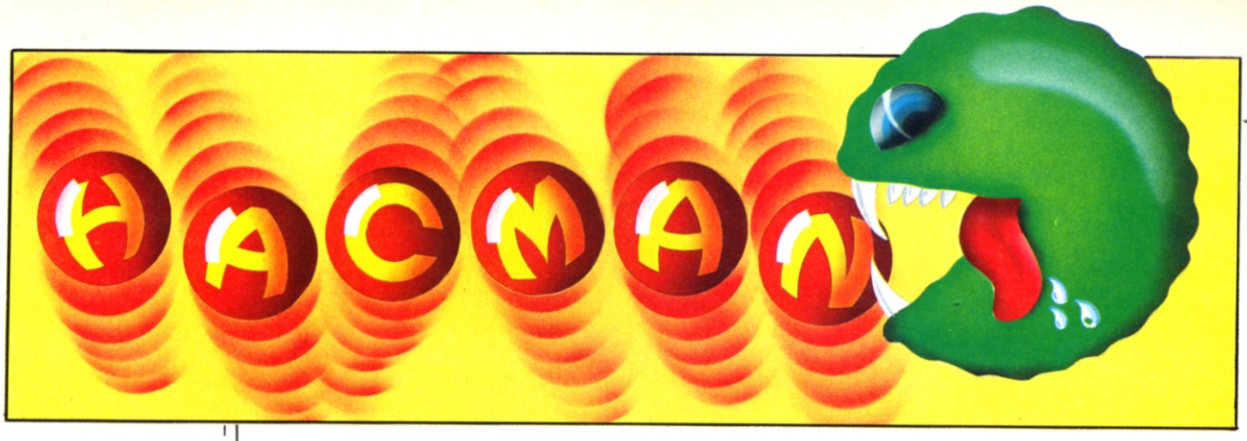

Featuring

The Living Daylights
Sphere of Destiny
Codename:Droid
Life of Repton
Strykers Run
Crazee Rider
Omega Orb
Psycastria
Arkanoid
Ransack
Impact

Re-living past glories

Hac Man discusses playing old favourites on updated machines

While making a plea for help with *Repton 2* in our February 1988 issue, I also mentioned that I had been devoting a lot of time to *Life of Repton*. Among the many readers who very kindly sent me the complete set of Life of Repton passwords is John Hughes of Bridgend, Mid Glamorgan, who suggested that they would help me cut my time down.

I am very grateful to John and everyone else, but you may be surprised to learn that in fact I rarely use my own – or anyone else's – cheat routines, especially when I am trying to achieve a new high score. I have still not even quite finished Around The World In Forty Screens but I'm sure that, given time, I'll get there.

Since I started this column I seem to have spent a lot of time discussing the many aspects of compatibility between the various models of the BBC Micro family caused, unfortunately, by illegal programming techniques.

This general subject is not a particular hobby-horse of mine but I just can't agree that once a game has reached the end of its effective selling life it is virtually worthless. I regularly play games that date from the earliest days of the BBC Micro – I'm sure I can't be the only one – and if I've upgraded to a Master why should I have to give up playing my favourites?

When I receive letters saying that older games do not work on newer machines I try to help. But in a hard world business sense must prevail if a software house is to survive. Previous columns have shown that many software houses do their best to help all their customers – but this should be counted an exceptional bonus, rather than a consumer right.

Since I first discussed software – particularly games – clashing with certain sideways roms, I have received letters from John Terry from Ruislip, Middlesex, and Andrew Thacker from Croydon, Surrey, with further examples of such clashes. Both problems concern our old friend Commander Stryker – John's with **Stryker's Run** and Andrew's with **Codename:Droid**.

John points out that Stryker's Run will not work on a machine fitted with the AMX Pagemaker roms. And Andrew has found – as I have – that Spellmaster corrupts the ropes in Codename: Droid, making it impossible to climb them. He has also found that if the machine has the Acorn TFS (teletext) rom fitted, with the Teletext Adapter switched on the game locks up with a blank screen instead of displaying the first title page.

The Acorn Teletext Adapter also interferes with both the cassette and disc versions of the Gary Partis' games **Psycastria**, **Sphere of Destiny** and **Impact** – all published by Audiogenic. If the adapter is plugged into the machine these games will crash, resetting to the power-up state.

This time, moreover, it makes no difference whether the unit is switched on or off, or even if there is no TFS rom: If the adapter is connected these games crash. The problem is that the

Help Corner

Kevin Sinclair of Luncarty, near Perth, has an answer to Carl Dimelow's problem – April 1988 – with *The Living Daylights*. Carl could not get past the man with the balloons on level five. Kevin says that you must shoot the balloons with the bazooka.

Life of Repton passwords

A	BABY 15890	SCHOOL 36216	TEENS 61268	WORK 21012	OAP 20910
B	KEYHOLE 44287	ADVANCE 14562	TURBINE 32854	INCLINE 7014	UNAWARE 18760
C	FAILURE 58847	BAPTISE 49514	WEAKEN 51857	HOSTAGE 60159	SOAKING 57020
D	GADGETS 24882	LESSONS 39008	CHEAPLY 53452	TWISTED 9677	EVOLVES 21489
E	REACTOR 61197	ZIPPERS 21622	OVERLAP 22068	TAXABLE 14439	QUIBBLE 52892
F	REUNION 19047	BLEAKLY 27442	PADLOCK 43672	WARTIME 21383	NATIVES 30995
G	OBSERVE 5067	CORPSES 4831	DIALLED 13517	ALGERBRA 57802	JUMPING 21164
H	DIVERGE 36440	ZYGOTES 21882	CIRCLES 4405	BETTING 996	SHALLOW 35064

B B+ Master Compact

games' protection runs through a number of checks before loading the main part and if the adapter is present one of these checks crashes the program.

The protection is too sophisticated to allow this routine to be modified to make it ignore the presence of an adapter – the only answer is to unplug it physically.

Now on with the hints, and until next month – happy hac-ing.

Crazee about Opus

Owners of the Opus DDOS disc system may remember a conversion routine published in the October issue to allow the Codename: Droid disc to run on their system. Mrs Eileen Powney of Bristol, author of that routine, has now come up with another, this time for **Crazee Rider**. Put the disc into the drive and enter the following lines:

```
PAGE=&1900
LOAD"MENU"
*LOAD LOADER 1B1E
!&1B46=&41472E4C
!&1B4A=&D454D
!&1B4E=&26D60929
!&1B52=&D363134
?&1904=&F4
RUN
```

Although this routine refers to the original Crazee Rider disc, it should work for the version of the game featured on **Play It Again Sam II** – but I haven't been able to try it yet.

Getting bug-eyed

Roger Griffiths of St. Davids, Dyfed has sent in a very useful conversion routine to allow Audiogenic's **Bug Eyes II** to work on the B+ and Master. Master owners should enter Listing I, and type:

```
RUN
```

Owners of both machines should then type:

```
LOAD"STARMAN"
41 REM
RUN
```

and the game will load and run perfectly. This routine works with both the original stand-alone game and the version of Computer Hits 10 Volume 4.

Chocka with cheats

Arkanoid, one of Peter Johnson's best-ever games, seems to be full of surprises. Jamie Pearce has brought me news of yet another built-in cheat facility. If you press Delete to pause the game, followed by pressing D, H and J simultaneously, you will advance to the next level.

Also, if you hold down P, A and J while on the high score screen, you will start a new game on the level on which you lost your last life.

Ransacking

I recently received a letter from Peter Scott, the first I had heard from him since he went off to university last year. Peter will be well known to many readers for his great arcade adventures, such as Omega Orb and the Thunderstruck series. Towards the latter part of last year he sent me a copy of his then new game, **Ransack**.

He described the two built-in cheat facilities, on the understanding that I would not publish them until the game had been out for a while, to give everyone a chance to play the normal game.

For the first one, play the game until you are invited to enter your name for inclusion in the high-score table. Type in:

```
WAMALAMADINGDONG
```

exactly as shown, without any mistakes. The next time you play the game, the counter will be corrupted but you now have about 230 lives.

The second one is a level jump: When the high-score table is being displayed press Control+f4. You will hear a quiet beep amid the music – which is, incidentally, a superb rendition of Kraftwerk's *The Model*. When you now press the spacebar, you will find yourself on Level 2.

Repeat this procedure to tackle any of the eight levels. However, the game will crash if you try to jump to a ninth, so be careful. Also, you'll always restart on the selected level and to return to a lower one you must reload the game, so exercise a little restraint.

On the general subject of Mr Scott, his previous offering, **Omega Orb**, also features a cheat facility. When you are accessing a computer terminal, type GROVEL and you'll be awarded an extra life, which you can sell if you are a bit hard up. You can use this feature repeatedly, so it can be quite useful for building up stocks of both lives and credits.

```
 10 REM Bug Eyes II VDU character definitions (for Master)
 20 REM by Roger Griffiths
 30 REM (C) The Micro User
 40 :
 50 VDU23,128,124,254,198,246,246,6,6,0
 60 VDU23,129,252,254,198,220,198,62,60,0
 70 VDU23,130,126,254,192,192,254,126,0,0
 80 VDU23,131,252,254,198,198,222,220,0,0
 90 VDU23,132,126,254,192,248,192,254,126,0
100 VDU23,133,126,254,192,240,192,192,192,0
110 VDU23,134,126,254,192,198,198,254,124,0
120 VDU23,135,198,198,254,254,198,198,6,0
130 VDU23,136,56,56,56,56,56,56,56,0
140 VDU23,137,12,12,12,12,12,124,120,0
150 VDU23,138,204,204,248,248,204,204,204,12
160 VDU23,139,192,192,192,192,192,254,254,0
170 VDU23,140,252,254,214,214,214,214,214,0
180 VDU23,141,252,254,198,198,198,198,198,0
190 VDU23,142,124,254,198,198,198,254,124,0
200 VDU23,143,252,254,198,222,220,192,192,0
210 VDU23,144,124,254,198,198,254,124,24,0
220 VDU23,145,252,254,198,220,222,198,6,0
230 VDU23,146,56,56,28,14,6,126,124,0
240 VDU23,147,254,254,24,24,24,24,24,0
250 VDU23,148,198,198,198,198,198,254,126,0
260 VDU23,149,220,222,198,110,108,124,56,0
270 VDU23,150,108,238,198,214,214,254,124,0
280 VDU23,151,0,238,254,24,254,238,0,0
290 VDU23,152,220,222,236,108,88,24,48,48
300 VDU23,153,254,254,28,56,112,254,254,0
```

Listing I: Bug Eyes II VDU character definitions

Riding high

Robert Miley from Snaith, North Humberside has sent me a useful tip for Kevin Edwards' *Crazee Rider*. If you press Tab when the lights are changing you will immediately be promoted to the next circuit.

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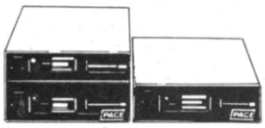

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B B+

Stick at it!

It's a challenge!

Mike Cook gives some hints and algorithms for his devious programming problem

IN our July issue we set a challenge to see if you could simulate the process of sticker collection – the sort where you buy a pack of five stickers at a time and put them in an album. This month we'll see how you can tackle such a problem by translating it into plain English. You can refer to the July issue to compare the techniques here with the original problem.

In the next issue of *The Micro User* we'll give you a no-frills program that will do the job along with suggestions for further improvements. You'll be able to check this against your own efforts and perhaps sort out any points you had difficulty with.

Remember, as far as a program is concerned, there are as many right answers as there are wrong ones, but the solutions I prefer are simple and readable. I will avoid, as much as possible, using fancy tricks or so-called clever programming techniques, as most of the time they are not necessary. So, without further ado, let's move on to a sticky problem...

We can represent each sticker with a unique number ranging from one to the total number in the collection. As we have five stickers per packet we can represent each as an element of an array and the number of sticker it is by the value in that array.

For example the first sticker in the packet could be called *PACK(1)* and this variable would contain a number identifying the picture on it. To generate a packet of stickers we need to assign each element of *PACK* a random number between one and the maximum number of stickers.

Next we need a computer representation for the album. This has to indicate if we have a sticker corresponding to that number. Again we can use an array: *ALBUM(T)* where *T* is the sticker number. In this we only need to indicate if we have that sticker or not and we can do this by assigning each array element to be either true or false. Initially, of course, we have no stickers so each space – array element – is assigned to false.

Now we have to stick the stickers in the album. With a little thought this is easily done: The value of the sticker becomes the index number of the album array. Simply assign those array elements to *TRUE* to indicate we have the sticker. If it is already assigned as true then we have a duplicate so it can be ignored.

Next we have to count how many stickers we have in our album to see if we have to buy another pack or can order the remaining stickers from the publisher who will usually sell you the last few.

Having completed the album we need to display the results and add them to the grand total. Then we can work out and display the average packets, cost and number of duplicates. In order to make the program interesting to watch it is a good idea to print out the number of stickers we have and how many we have to collect to complete the current album.

Finally, rather than build constants into your program arrange it so that all the parameters of the simulation are stored in variables so you can easily change them to simulate different collection schemes.

For example the number of stickers to collect and the number of stickers you can buy to complete your collection should be declared in a line near the start rather than being hard coded in the program. Get the inner routine working first, the one to fill up one album, and then extend it to calculate the average of many tries.

● *So there it is: All the help you could want short of me doing it for you – which I will next month. So, before then, see if you can write the simulation yourself.*

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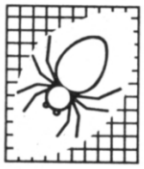

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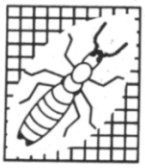

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CEEFAX Guide

B B+ M

Software is currently transmitted for a period of one week. The files are updated on Fridays and there will be periods during the update day when they are unavailable. The program details given are provisional.

June 1 to 7

Morse
Teach yourself Morse code with this easy to follow tutorial guide. Practice reading code generated by the micro or enter your own words for translation. The program can also monitor the user port to detect any Morse code being sent, storing it in memory until you are ready to listen. Alternatively, code can be sent to any suitable device connected to transmit the signals.

Globe
Globe2
A very clever piece of animation, showing the BBC globe rotating. A superb demonstration of the display characteristics of the BBC Micro.

Timer
Tmr/Inf
A routine to keep track of your recordings – on video, cassette or reel-to-reel. Timer calculates the duration of recordings from the tape counter, and vice-versa.

T/SWR01
ReadROM
Part one of a series to help BBC Micro owners get more use from sideways ram and rom facilities. Sideways ram is available as standard on all Masters and as an add-on option for the BBC B. T/SWR01 describes how banks of rom or ram are switched in and out of the micro's memory map, and how to read the contents of a rom that is currently switched out.

Pinball
A superb arcade simulation of a pinball machine from the February issue of *The Micro User*.

July 8 to 14

T/SWR02
Trace
Readrom
Part two of our series looks at how sideways roms are constructed and in particular the structure of the rom header which identifies it to the operating system. Service calls are also discussed.

Strangers
Parents will already know of the dangers of children being lured away by strangers – but it is very difficult to impress upon youngsters the need to be continuously alert to this type of peril. Even the most attentive child may find it difficult to remember the frequently quoted phrase *don't go with strangers* if such a situation were to arise. The program helps to impress children with this vital message.

Lister
Instruc
File
Make your printed listings of programs neat, tidy and very readable. Routines are highlighted and many other useful features employed to ensure debugging, modifying or just studying a program is made as simple as possible.

Data
Words
Leader
Produce wordsearch puzzles automatically. Just give the micro your selection of words to be included and wait as the completed puzzle is produced.

Avengence
An excellent graphical version of the hidden-code strategy game from the January issue of *The Micro User*.

July 15 to 21

CatDisc
CDinfo
Obtaining details of the contents of any disc is a useful facility for a wide range of programs. CatDisc can be appended to your own Basic programs, returning in a string array the name of every file held on the disc in the specified drive. Suitable for both DFS and ADFS.

ClkSet
SetClk
A very simple to use utility to correct the internal clock of the BBC Master computer using the Ceefax information via your teletext adapter.

Flip
A unique and interesting game to keep your mind active and your fingers nimble.

T/SWR03
NewCom
Trace
Continuing with the sideways ram programmers series, T/SWR03 shows how a simple one-command interpreter can be constructed so an additional star command can be implemented.

Archive
An automatic way to safeguard your disc files by copying them to tape. Published in the January issue of *The Micro User*.

July 22 to 28

T/SWR04
Enable
EnabTst
T/SWR04 looks at the *ENABLE command and shows how to use it from your own software.

Backup
IBack
A rapid disc backup utility for use with a Master 128. Large time savings can be achieved for owners of single disc drives, with an 80 track disc being copied in under two minutes involving just four disc swaps.

Wordbox
Intro
WBdata
Can you work out the hidden message in the wordbox before your opponent does? This two-player game will keep you thinking.

Recover
An easy-to-use utility to help you rescue lost disc files. It was first published in the February issue of *The Micro User*.

July 29 to Aug 4

T/DFS00
IDSDump
Verify
Beginning a major new series for programmers wishing to know more about a variety of aspects of the BBC Micro. The first eight modules of the new opcodes series looks at the Acorn DFS and how to utilise its various facilities and functions at any of the three available levels – via OS commands such as BGET and *SAVE, using osword calls or by directly accessing the floppy disc controller chip itself.

In studying the principles of storing information on disc, producing non-standard format discs for copy protection is also discussed. Opcodes tells you everything you ever needed to know about the DFS.

T/SWR05
Cursor
More from the series explaining the intricacies of using sideways ram areas of memory. This module explains how to incorporate arguments typed in after a star command into your own software.

Alginon
A set of useful routines to incorporate in your own Basic programs, all concerned with producing graphical representations of data.

T/Strip
M/Strip
M/Spool
Routines to save text from the View word processor in a form that can be used by any other word processor – even on a different type of micro. The programs operate as printer drivers, but send the output to disc rather than paper, overcoming the problems of using the inflexible SAVE and SPOOL commands.

Gloop Gulp
In this super game from the November 1985 issue of *The Micro User* you must take charge of the Gulper before the Green Gloop gets out of hand and covers everything.

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● Teletext Receiver for BBC/B Advanced TFS boxed, hardly used £60. Tel: 01 317 1836 (Mike) after 6pm.

● JP101 printer £30. Unused Taxan 12" monitor £30. Tel: 01 861 0774 evenings.

● BBC 400K disc drive, 256k board, Viglen case, lots of books, mags, software, joysticks, T/ball etc £450 o.n.o. Tel: Steve 0634 404473.

● BBC tape software for sale. Please Tel: 0656 724778 for details.

● BBC B 1.2 Watford Electronics 32k shadow ram, sideways ram, rom board, W.E. DDFS, user guides and manuals £250 o.n.o. Dr Pace Tel: Stamford (0780) 64501 ext 3296 (days), ext 339 (eves).

● Master 128, 400k drive, Trackball, control Rom, Rom cartridge, Elite, manuals one, two, advanced. Bargain £375. Tel: (Bradford) 0274 590021 evenings.

● Portable Tandy model 102 for files business or home £175 o.n.o. Tel: Nottingham 581065 evenings.

● Master 128 £290. Morley Eprom Programmer £22. Tel: 04243 4500.

● BBC B 32k 16 socket Ram/Rom board. Double 40T Teac D/D. Wordwise, Exmon, Beebmon, Beebcalc, Disc Doctor, Acorn DFS, games, magazines £450. Tel: 0277 352525.

● Wanted Wordwise Plus, Word-Aid, Spell Master and View chips. Tel: 0242 584753.

● Electron software – mostly games. S.a.e. E.J.Byne, 32 Harfield Road, Sunbury, Middx, TW16 5PT.

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● Sendata series 700, Acoustic coupler 300 BPS £25. Tel: Thomas 01 249 7440.

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● BBC B Issue 7, Acorn DFS, software, Advanced user guide £225. Tel: Sunbury 788322.

● PC Emulator £60. Zarch £10. Tel: Simon (0829) 260476 evenings.

● BBC B, Wordwise+, Opus disc drive, Philips portable colour Tv £350 o.n.o. Juki 6100 £200. All vgc. Tel: 0302 770414 evenings.

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ACCESSING A BUG LEADS TO DISASTER

I HAVE encountered a disaster which can happen when using random access filing techniques with the disc system. The file I was using contained records of length 514 bytes and was accessed like this:

```
3820 X=OPENUP"SENTS"
3830 PTR#X=5+(N%-1)*514
```

Line 3820 sets the file pointer to the beginning of the N%th record.

As a result of some careless coding earlier in the program it was possible for the value of N% to be zero, causing PTR#X to be assigned a negative value.

I would have expected the program to stop with some sort of error message. What actually happened was that the DFS replaced the whole file SENTS with a series of null characters right to the end of the disc.

I have tidied up the earlier coding to make sure the N% cannot take a value of zero. However as a precaution there is also a trap in lines such as 3830 to guard against possible file destruction:

```
3830 IF N%>0 THEN PTR#X
=5+(N%-1)*514 ELSE CLOSE
#X:STOP
```

Can you explain this strange DFS behaviour? – **Peter Davy, Wakefield, West Yorkshire.**

● It appears you have come across a combination of a feature and a bug. The former relies on the fact that no matter how many bytes the disc can store the DFS will accept any pointer value – so that your programs don't need to be altered to take advantage of bigger storage devices when they appear.

Pointer values can range from 0 to 4,294,967,295 – what would be negative to Basic is treated as an even bigger positive number.

The bug is that if the DFS thought it had a big pointer value it should have just extended the file and not overwritten the original data.

Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

Writers of the most interesting letters receive a £10 prize.

Z88 control codes

IN the June edition of The Micro User, *D.H. Griffin wrote describing a problem with transferring programs to his Z88 from a BBC Micro: He was finding that all his % signs were changed to %PC%.*

This is due to the fact that the file was edited with Pipedream and saved directly. It should have been saved with the Plain Text option set to Yes on the Save menu.

Pipedream uses the % character in its internal format to introduce special markers. The sequence %PC% means this is not one of these markers – it really is a percentage sign. – **Paul M. Fellows, Software Manager, Cambridge Computer.**

£10 prize letter

Dangerous RUN

*MACHINE code programs which make use of routines in the Basic rom will only work if the rom is paged in to &8000 to &BFFF. Basic will be paged in if the program is activated by CALL, but if *RUN is accidentally used – perhaps from force of habit – disaster could strike.*

For example, if a DFS is in use it will be paged in and the disc could be corrupted when the program is executed if it is not write protected. In any event the program will not work.

Such hazards can be avoided by starting the assembler code with the routine listed below.

It works by first checking if the Basic rom is paged in. If it is, control goes directly to the program proper, which is then executed.

If it is not paged in, a message is displayed instructing you to CALL the start of the program and control goes to command mode. After the CALL the program executes normally.

The routine has been written so that it can be run as a demonstration and when executed simply prints S. Type it in, save it as ROMCALL and then run it. The object code will automatically be saved as ROMCAL#. Now try:

```
*LOAD ROMCAL#
```

followed by:

```
CALL &5000
```

Then switch the micro off and back on and try:

```
*RUN ROMCALL#
```

For inclusion in your own programs the following alter-

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```
  10 REM Basic rom calls
  20 REM By H.R.Hall
  30 FORpass%=0TO3 STEP3
  40 P%=&5000
  50 [OPT pass%
  60 .checkrom
  70 LDA #&BB:LDY #&FF
\Is Basic rom
  80 LDX #0:JSR &FFF4
\paged in?
  90 CPX &F4
 100 BNE abort
\no
 110 JMP begin
\yes
 120 .abort
 130 LDA &202:STA &70
\Save BRK
 140 LDA &203:STA &71
\vector
 150 LDA #abort3 MOD &100
\Re-address
 160 STA &202
\BRK vector
 170 LDA #abort3 DIV &100
\to point
 180 STA &203
\to abort3
 190 BRK
\go to abort3
 200 .abort3
\print message
 210 JSR &FFE7:LDX #0
 220 .abort2
 230 LDA text,X:CMP #13
 240 BEQ finish:JSR &FFEE
 250 INX:JMP abort2
 260 .finish
 270 LDA &70:STA &202
\restore
 280 LDA &71:STA &203
\BRK vector
 290 RTS
\jump to command mode
 300 .begin
\start of program
 310 LDA #83:JSR &FFEE
 320 RTS
 330 .text EQUS"CALL&5000"
\message
 340 EQUB 13
 350 ]
 360 NEXT
 370 *SAVE ROMCAL# 5000 50
53
 380 END
```

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ations should be made:
☐ Delete lines 10 to 50
☐ Delete lines 310 to 320
☐ Delete lines 350 to 380
☐ Alter address in line 330 to start of your program
☐ Insert your program starting at line 310
☐ Move lines 330 and 340 to a suitable place near the end of the your program. – **H. R. Wall, Broomhall, Worcester.**

Breaking from software

BEFORE getting my Master 128 I used a standard BBC B and with certain hardware/firmware I was able to simulate the Break which was necessary to enable the firmware to grab workspace. This was done by using either CALL !–4 or sometimes *BREAK – available on the AMX rom.

Both these methods proved very useful from time to time as they could be incorporated into appropriate Boot files – particularly when trying to make software user-friendly or idiot-proof.

However it seems that the Master series requires a Control+Break to initialise certain roms and my previous method no longer works.

Is there a neat software solution to the problem, or is it mandatory to physically press the keys? – **H.L. Smith, Little Bealings, Woodbridge.**

● Put *FX151,78,127 in your software before the CALL !–4 command. This works on all versions of the 8 bit BBC Micro without second processor, but note that the FX call disables the keyboard so it can't be used directly from Command mode. Do any of our readers know a second processor compatible method?

Overheating micro chips

SOME of the ICs in the BBC B tend to get rather hot, particularly if an internal rom extension board is fitted. IC14 – an 74LS245 dual bus transceiver – is a common victim and I have replaced this twice so far.

It plugs into a 20 way DIL socket and everything works until the micro gets hot when all sorts of strange things start to happen.

Basic programs behave abnormally or crash and odd letters and bits of text appear or disappear from word processor output. The effects get worse with time, but spray freezing the chip usually brings things back to normal.

One odd thing is that the defective chips from my BBC Micro behaved quite normally under load on an IC tester when cold.

You can get clip-on heatsinks, but there usually isn't room to fit one under an extension rom board. I chopped a T0220 heatsink in two, bent the fins nearly flat and stuck it to the top of the chip with epoxy. This fitted under my extension board and seems to have cured the problem.

A top hat of 18 gauge aluminium sheet should also work. You must check that the heatsink is clear of the extension board and of the other chips – you don't want to turn a problem into a catastrophe.

The chip costs about £1.50 and is a good first guess for the DIY repairer with a load of roms, a sick BBC Micro and a can of freezer. I would like to thank Watford Electronics for this tip. – **C.J. Chapman, Nuneaton, Warwickshire.**

Archimedes OS bug

THERE is a bug in the Archimedes operating system with the *FX220 command.

Normally it allows selection of an alternate Escape key. For instance Space has the Ascii code of 32 therefore *FX220,32 will cause the spacebar to act as the Escape key in the place of the real key.

Similarly Control+A, which generates Ascii code 1, can be set to act as Escape with *FX220,1.

However *FX220,0 which should turn Control+@ into Escape also makes pound, accent and some other keys generate Escape too.

The Contex Computing Archimedes Bank Manager used *FX220,0, and as a consequence a user can inadvertently Escape from a module.

This has now been fixed by a different command and if you have version 3.0 or 3.1 you can return the original disc to Contex with an SAE for a free upgrade. – **Ian Whiting, Contex Computing, Copie, Bedford.**

Servicing the MOT

I HAVE a problem with the Disc MOT program from the October 1987 issue of The Micro User. I have typed it in and, thanks to the checksum, eliminated all my errors except one.

The problem occurs in line 1800, for which I have typed:

```
OPT FNequs("Fixing Track:
 "):OPT FNequb(131):OPT FN
equs("Sector:00"):OPT FNe
qub(42)
```

This generates a checksum of D686 D and not the one published – CF25 5.

I have checked it many times and still can't find an error, but when the assembled program is *RUN it works fine until it formats the disc and then reports Fatal disk error.

This happens with all discs, including healthy ones.

Could you please tell me what is causing the checksum difference? – **David Key, Heanor, Derbyshire.**

● The program unfortunately contained embedded teletext colour codes – namely character 135 – which we didn't spot, and our typesetting

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Plugging the leaks

HERE'S a corrected and improved version of the Leaky Listing program published in the May 1988 issue of The Micro User.

It includes procedures and functions making the program structured and easy to follow. It does not jump out of a loop, as the original routine did in line 90.

Keep up the great work: These Leaky Listings are excellent – try to make them even harder.

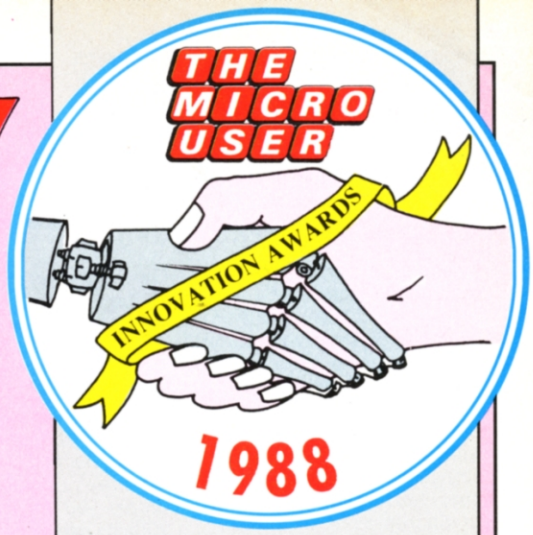
More assembler programs too please. The one in the April issue was great but taxing to me as I'm quite a novice in machine code. And I like the idea of printing the answers in the next issue – it stops me from peeping at the answers.

The series is brill – and so is the whole magazine. I buy both The Micro User and Electron User and I haven't found a fault with them yet. – **Paul A. Clarke, Golborne, Warrington, Cheshire.**

£10 Prize letter

```
   10 REM Guess a number
   20 REM re-written
   25 REM by Paul A. Clarke
   30 MODE 7
   40 PROCinit
   50 REPEAT
   60 correct%=FNguess(numb
er%)
   70 UNTIL turns%=0 OR cor
rect%
   80 IF correct% PRINT"Ye
s, that was correct." ELSE
PRINT"The number was ";num
ber%
   90 END
  100 DEF PROCinit
  110 PRINT"Guess a number"
  120 INPUT"Guess a number
 from 1 to :"high%
  130 INPUT"Number of turn
s allowed",turns%
  140 number%=RND(high%)
  150 ENDPROC
  160 DEF FNguess(number%)
  170 REPEAT
  180 INPUT"Enter guess:"g
uess%
  190 UNTIL guess%>0 AND gu
ess%<=high%
  200 turns%=turns%-1
  210 IF guess%>number% PRI
NT"Too large"
  220 IF guess%<number% PRI
NT"Too small"
  230 =(guess%=number%)
```

Take part in our nationwide search for innovation in action



Last year's Innovation Award was an outstanding success with more than 500 users of the BBC Micro competing for the prestigious accolade.

Entries came from all over the world, from health researchers, engineers, teachers and students – all with remarkable applications which pushed the BBC Micro to its limits and beyond. The press response was enormous with top coverage in hundreds of newspapers throughout the country.

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Tell us what your BBC Micro or Acorn Archimedes is doing that is out of the ordinary. It may be a project with exciting commercial potential, with significant social benefit – or even just for fun. Whether you're an individual, group, school or business, this contest is open to you – there's no restriction.

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In the Archimedes category the prize will be a powerful Brother 1709 printer, supplied by Kelator, Acorn's distributor to the trade. The 1709 can output text in three different modes – draft, near letter quality and letter quality – at speeds of up to 240 cps. The package will also come with unique software to make the most of the Archimedes' special features. Value: £685.

And both winners will receive an impressive plaque in recognition of their achievements.

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machine converted this into the underline character.

However the program should work. There were some amendments to cater for all DFSs in our December 1987 Letters section.

Also anyone using Basic I will find that the colons within strings in the assembly language cause errors and need to be replaced by another character, say =.

Doctoring databases

I HAVE built up many files on Acornsoft's disc-based Database, and now need to merge files to carry out a sort on the combined file. Can you suggest a simple routine to merge two files of an identical format?

Of lesser priority, but nevertheless useful, would be a routine to delete fields and to rearrange the order of fields to bring files into the same format. — **Allan Swift, Dorking, Surrey.**

● Combining database data without a utility is very unlikely to succeed — even when they are of the same format — because the file pointers which keep track of where the data is within the file, will not be set up correctly.

Perhaps one of our readers has a utility that can merge these files?

£10 Prize letter

MORE MEMORY ON PC EMULATOR

HERE is a useful tip for any users of Acorn's PC Emulator on the Archimedes. Initially when you re-configure the machine as suggested by Acorn, you have little over 300k to use.

This is not much good for most programs, so by using my method, you can increase the usable memory under MSdos to about 580k. It works as follows:

☐ *Note current configuration on piece of paper or spool it to a disc file.*

☐ *Type *MODULES*

☐ *Most of the resident modules claim workspace on power-up, so you can unplug them as they will not be required under MSdos. All but the top four modules may be unplugged. This is achieved by using:*

```
*UNPLUG <Module name>
```

For example:

```
*UNPLUG WaveSynth
```

Repeat for modules 5 to 20.

☐ *Finally press Control+Break and type *MODULES — only modules 1,2,3,4 should remain.*

When you boot up the emulator you will see that approximately 576k of memory is registered.

To reset the modules, the handiest method is to switch off, hold down R and switch on twice to reset the cmos ram as detailed in the Welcome guide.

Also, I've got Inter-Chart to run to the Archimedes — proving it is legally written software. It is very simple: All you need is a rom image of ICHART and the 6502 Emulator.

*Run the emulator, type *ICHART and it will work as normal except that function key f0 is now the Print key.* — **Richard Charles, Londonderry.**

Checking up on a checksum

AFTER I bought the February 1988 issue of The Micro User *for the first time in months I was instantly impressed by the new format. Write on lads! Definitely worth the money and a subscription.*

I think your Library section and Checksums are a brilliant idea, but after typing in the Vertical labeller program I found a small mistake. The problem I had was in line 100 where I kept on getting a Missing) message.

So I checked the program with the Checksums program and found that my checksum didn't correspond with what was in the magazine.

I'm not exactly excellent in Basic so after a bit of mathematical genius (if I may say so myself) I bunged in a minus sign (—) and lo and behold it worked. The correct line corresponds to the given checksums and should be :

```
100 MOVE X%,Y%-32*(LEN
(L$)-N%):VDU255
```

After that I tried other mathematical, symbols and combinations of other symbols and thought your readers may be interested in a few suggestions to brighten up their displays:

```
100 MOVE X%,Y%-32*(LEN
(L$)*N%):VDU255
```

really spreads out the text.

```
100 MOVE X%,Y%-32*(LEN
(L$)+N%):VDU255
```

reverses the text down the screen. — **Andrew Leong, Eccles, Manchester.**

ZERO IN ON THE STARS

QUITE a long time has elapsed since I learned to navigate my way around the night sky with a bubble sextant and a copy of the Air Almanac, but I still maintain some interest in star recognition.

I was very interested, therefore, in Mike Cook's Body Building Course in April's issue, and intend typing in his listing soon.

However, when reading the comments about setting up the theodolite I was rather puzzled by one fact.

Mr Cook suggests using a compass to see the azimuth to 0 degrees when pointing North, but does not mention that an allowance should be made for magnetic variation — the angular difference between Magnetic and True North — when doing this.

At the moment I believe that the variation for this part of the world is eight degrees East of North as indicated by the compass.

This is quite a substantial amount, and I feel it might be sufficient to cause problems for a newcomer. — **W.H. Foggan, Newcastle upon Tyne.**

● Good point, but we think that using a home-made theodolite the few degrees of error are likely to be outweighed by the inaccuracies of the device itself.

Laser printing

I HAVE recently bought a Hewlett Packard Laserjet series 2 printer and it works wonders on my Apricot Xen. But it does not work on my BBC B — it keeps on repeating on one line and does not go on to the next. Please could you tell me how to correct this? — **Nicholas Longfield, Thirsk, N. Yorks.**

● Unfortunately nobody in the office has any experience with this printer which — don't be fooled by the name — is not a laser printer but is actually a high quality inkjet. So we can't help; can any reader?

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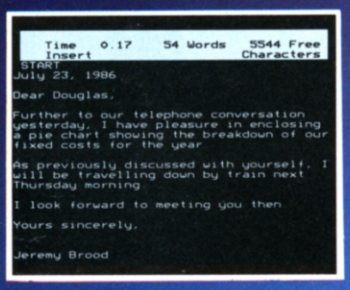

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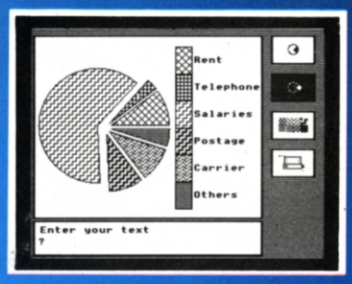

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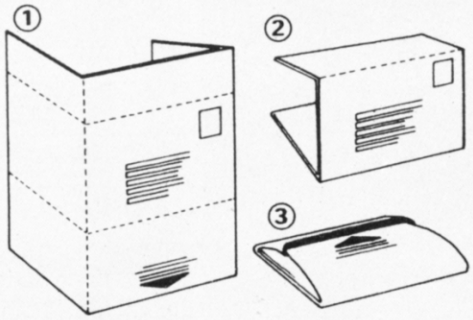

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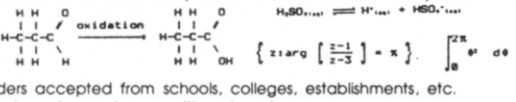

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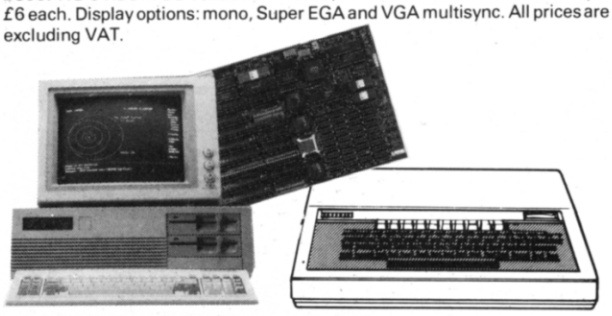

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